(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号
特開2001－3253
（P2001－3253A）
(43)公開日　平成13年１月９日(2001.1.9)

(51)Int.Cl.⁷	識別記号	FI	テーマコード（参考）
Ｄ０４Ｈ　1/54		Ｄ０４Ｈ　1/54	Ａ　３Ｂ０２９
			Ｑ　４Ｃ００３
Ａ６１Ｆ　13/53		Ａ４１Ｂ　13/02	Ｂ　４Ｌ０４７
13/49		Ａ６１Ｆ　13/18	３１０Ｚ
13/46			

審査請求　未請求　請求項の数13　ＯＬ　（全 13 頁）　最終頁に続く

(21)出願番号　特願平11－192240

(22)出願日　平成11年７月６日(1999.7.6)

(31)優先権主張番号　特願平11－115872
(32)優先日　平成11年４月23日(1999.4.23)
(33)優先権主張国　日本（ＪＰ）

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Ｆターム(参考)　3B029 BC02 BC06 BC07
4C003 BA01 BA02 BA08 BA09
4L047 AA14 AA21 AA27 AA28 AB02
BA09 BB09 CA05 CA06 CA07
CA19 CB01 CB02 CB10 CC04
CC05

(54)【発明の名称】　不織布およびそれを用いた吸収性物品

(57)【要約】
【課題】 嵩高さ、強度、柔軟性、伸長性においてバランスのとれた不織布を提供し、また、それを用いた複合化不織布や伸縮性複合シートを提供すること。加えて、それら不織布や伸縮性複合シートをその一部に用いた吸収性物品を提供すること。
【解決手段】　低融点成分と高融点成分からなる熱融着性複合繊維を主体とする不織布であって、該不織布は熱接合領域（Ｉ）と、非熱接合領域（II）とからなり、前記熱接合領域（Ｉ）は、熱融着性複合繊維により熱接着されており、且つ該熱接着された部分は、繊維が圧着扁平化することなく繊維交点が熱接着されており、非熱接合領域（II）は熱接着がされていない部分であることを特徴とする不織布およびそれを用いた吸収性物品。

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【特許請求の範囲】

【請求項１】　低融点成分と高融点成分からなる熱融着性複合繊維を主体とする不織布であって、該不織布は熱接合領域（Ｉ）と、非熱接合領域（II）とからなり、前記熱接合領域（Ｉ）は、熱融着性複合繊維により熱接着されており、且つ該熱接着された部分は、繊維が圧着扁平化することなく繊維交点が熱接着されており、非熱接合領域（II）は熱接着がされていない部分であることを特徴とする不織布。

【請求項２】　目付が５～６０ｇ／ｍ²である請求項１に記載の不織布。

【請求項３】　不織布の繊維流れ方向に対して直角方向の強伸度曲線において、最大強度の４０％～６０％に相当する応力部分が波形変動を示す請求項１または２に記載の不織布。

【請求項４】　波形変動の応力変動率が２．０％以上である請求項１～３のいずれかに記載の不織布。

【請求項５】　ドレープ係数が、０．５以下である請求項１～４のいずれかに記載の不織布。

【請求項６】熱接合領域（Ｉ）の面積の不織布全体の面積に対する面積率が２５～８０％であり、該不織布の破断伸度が１００％以上であることを特徴とする請求項１～５のいずれかに記載の不織布。

【請求項７】　不織布の破断伸度が、１００～２００％である請求項１～６のいずれかに記載の不織布。

【請求項８】　不織布の最大強度をＳ（kgf/5cm）、伸度をＥ（％）、比容積をＶ(cm³/g)とした場合、$SE^2V \geqq 2.70\times10^3$、である請求項１～７のいずれかに記載の不織布。

【請求項９】　熱融着性複合繊維の高融点成分が、ポリプロピレンまたはポリエチレンテレフタレートである請求項１～８のいずれかに記載の不織布。

【請求項１０】　不織布が熱融着性複合繊維と他の繊維との混綿からなる請求項１～９のいずれかに記載の不織布。

【請求項１１】　請求項１～１０のいずれかに記載の不織布と、他の不織布，フィルム，パルプシート，編物，及び織物から選ばれた少なくとも１種を積層した複合化不織布。

【請求項１２】　請求項１～１０のいずれかに記載の不織布と、天然ゴムエラストマーまたは熱可塑性エラストマーの群から選ばれた少なくとも１種である伸縮性部材シートとを積層した伸縮性複合シート。

【請求項１３】　請求項１～１２のいずれかに記載の不織布、複合化不織布または伸縮性複合シートを、一部に用いた吸収性物品。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、不織布およびそれを用いた複合化不織布、及びそれらを用いた吸収性物品

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に関するものであって、さらに詳しくは、嵩高で優れた柔軟性あるいは伸長性をもつ、熱融着性複合繊維を主体とした不織布及び、それを用いた複合化不織布、伸縮性複合シート、及びそれらの不織布または伸縮性複合シートを用いた、生理用品、使い捨て紙おむつ、吸収シートなどに代表される吸収性物品に関する。

【０００２】

【従来の技術】近年、生活様式の多様化に伴い、使い捨ての紙おむつや生理用ナプキン、吸収シート等に代表される吸収性物品の性能は、より高度化，多機能化したものが求められている。例えば、使い捨ての紙おむつは、一般的に、液体透過性の表面材、ポリエチレンフィルム等の液体不透過性のバックシート、および前記表面材とバックシートとの間に、木材パルプ綿、セルロース綿、コットン綿、レーヨン繊維、高分子吸収体等からなる液体保持のための吸収層を備えており、その他、漏れ防止のためのサイドギャザー等の構成部材から成っている。

【０００３】これらの構成部材のうち表面材には、速やかな液体透過性に加えて、より高風合いで装着時の快適な使用感が求められている。また、サイドギャザーには、排泄された尿や軟便を漏らさない高いバリア性と、身体との隙間をできるだけ無くすような密着性，伸縮性に加えて身体に密着した際の風合いを考慮して柔軟性と嵩高性が求められている。このような構成部材には主に不織布が用いられており、当然、不織布はこうした要求性能を満たすためにより多機能化し、高性能化が求められている。

【０００４】一般に熱融着性複合繊維は、高融点成分と低融点成分を併せ持ち、繊維ウエッブに形成された後、低融点成分の融点以上、高融点成分の融点未満で加熱することによって各繊維間の接触部が軟化あるいは溶融して接合し、不織布を形成する。主な加熱の方法としては、繊維ウェッブをエンボスロール等によって挟んで、その一部分を圧着扁平化させる方法や、繊維ウェッブ全体に熱風を吹き付けてその低融点成分を軟化あるいは溶融させる方法などがある。吸収性物品の表面材としての要求性能に対し前者の方法は、繊維ウェッブを部分的に圧着させるものであるため、圧着された部分は硬くなるが、圧着部分と非圧着部分との境界等で折れ曲がりやすくなり、ある程度の柔軟性がある不織布となる。しかし、不織布全体の嵩高性が殆ど失われてしまい、かつ、圧着部分は、尿、経血などの人体からの排出される液体に対し不透過であるため、吸収性物品の表面材としては、好ましくない。一方、後者の方法は、繊維ウェッブの嵩を残したまま熱風を通すものであるため嵩高性があり、クッション性もあるが、一定の曲げに対して不規則な折り山（ツノ）が出やすく、柔軟性に乏しい不織布になる。そこで従来から、繊維ウェッブに熱風を吹き付けてその低融点成分を軟化あるいは溶融させる方法において、その吹き付け方等を検討し、嵩高で柔軟性のある不

繊布を得ようとする試みがなされてきた。例えば、多孔性部材を介して複数のオリフィスから高圧高速の加熱気体を噴出させて熱処理する方法（特開昭５７－４７９５８号公報）が提案されている。しかし、このような加工方法では、生理用品、生理用ナプキンまたは使い捨て紙おむつ、吸収シートなどに代表される吸収性物品に通常よく用いられる、比較的低目付で低密度の不織布を得ようとした場合、加熱気体を亜音速から超音速の風速で複数のオリフィスから噴出させて繊維ウェッブに吹き付けるために、繊維が圧着偏平化し、繊維ウェッブの嵩を大幅に減じてしまう恐れがある。また、熱風の吹き付け時に構成繊維の飛散により繊維ウェッブに穴が開いてしまう恐れもある。

【０００５】また、最近では、新たにパンツタイプ（はかせるタイプ）の使い捨て紙おむつが多く使用されるようになり、その構成部材の数も増え、複雑化してきた。このようなパンツタイプの使い捨て紙おむつは、これまでのテープタイプ（フラットタイプ）の紙おむつと異なり、装着者が立ったまま装着することを想定したタイプであるので、紙おむつの持つ伸縮性がそのまま装着性に結びつき、併せて装着者への密着性となる。特に腰回りの伸縮性がより重要な課題となっており、そのような部材には高い伸縮性を持った伸縮性シートが用いられている。しかしながらこのような伸縮性シートは、伸縮性は高いものの総じて嵩がなく、シートの表面状態は粘着感があるものが多い。そこで風合いを向上させるために不織布が貼り合わされており（この場合、不織布の間に伸縮性シートを挟み込んだサンドイッチ状の積層構造が多い）、この様な貼り合わせ不織布には嵩高で風合いが良く、かつ伸縮材への追随性，伸長性等の特性が求められている。

【０００６】上記要求特性を満たすために、熱融着性複合繊維を使用した不織布が多く用いられ、改良が成されてきた。例えば、特開平０９－１１７９８２号公報では、熱融着性繊維が互いに交絡してなる不織布と熱可塑性エラストマーからなる伸縮性シートとをロール加工で熱接合してなる複合シートが提案されている。しかし、熱融着性繊維が互いに交絡してなる不織布は、ある程度の風合いの良さを持っているものの、製造工程が複雑で加工速度をあまり上げられないためにコストがかかり、なおかつ繊維の交絡により不織布の嵩が出にくい。また、特開平０９－７８４３６号公報では、合成樹脂からなる不織布を加熱し、延伸した伸縮性不織布が提案されている。しかし、前記と同様に繊維の交絡や、熱エンボスロールを使用して繊維を圧着させており、いずれも嵩を減じてしまい好ましいものとは言えない。また、延伸による不織布表面の荒れ、毛羽立ちが懸念され、風合いを損ねる恐れがあるので好ましくない。

【０００７】本発明の目的は、上記従来技術の問題を解決することである。すなわち、嵩高で優れた柔軟性を持つ不織布を提供することであり、または嵩高で優れた伸長性をもつ不織布を提供することである。また、それを用いた複合化不織布や伸縮性複合シートを提供することにある。加えて、それら不織布や伸縮性複合シートをその一部に用いた吸収性物品を提供することである。

【０００８】

【課題を解決するための手段】本発明者らは、前記課題を解決すべく、鋭意検討を重ねた結果、熱融着性複合繊維を主体とした繊維ウエッブの、任意の部分だけに低風速の熱風を通して、圧着扁平化されない集中的に熱接着された部分を多数有する熱接合領域（Ｉ）と、非熱接着部分（II）とを有する不織布に加工することで、嵩高性を保持したまま、これまでにない優れた柔軟性や伸長性を持つ不織布が形成されることを知り、本発明を完成するに至った。

【０００９】本発明の不織布は、以下の（１）～（１３）の構成よりなる。

（１）低融点成分と高融点成分からなる熱融着性複合繊維を主体とする不織布であって、該不織布は熱接合領域（Ｉ）と、非熱接合領域（II）とからなり、前記熱接合領域（Ｉ）は、熱融着性複合繊維により熱接着されており、且つ該熱接着された部分は、繊維が圧着扁平化することなく繊維交点が熱接着されており、非熱接合領域（II）は熱接着がされていない部分であることを特徴とする不織布。

（２）目付が５～６０ｇ／ｍ²である（１）項に記載の不織布。

（３）不織布の繊維流れ方向に対して直角方向の強伸度曲線において、最大強度の４０％～６０％に相当する応力部分が波形変動を示す（１）項または（２）項に記載の不織布。

（４）波形変動の応力変動率が２．０％以上である（１）～（３）項のいずれかに記載の不織布。

（５）ドレープ係数が、０．５以下である（１）～（４）項のいずれかに記載の不織布。

（６）熱接合領域（Ｉ）の面積の不織布全体の面積に対する面積率が２５～８０％であり、該不織布の破断伸度が１００％以上であることを特徴とする（１）～（５）項のいずれかに記載の不織布。

（７）不織布の破断伸度が、１００～２００％である（１）～（６）項のいずれかに記載の不織布。

（８）不織布の最大強度をＳ（kgf/5cm）、伸度をＥ（％）、比容積をＶ(cm³/g)とした場合、$SE^2V \geqq 2.70 \times 10^5$、である（１）～（７）項のいずれかに記載の不織布。

（９）熱融着性複合繊維の高融点成分が、ポリプロピレンまたはポリエチレンテレフタレートである（１）～（８）項のいずれかに記載の不織布。（１０）不織布が熱融着性複合繊維と他の繊維との混綿からなる（１）～（９）項のいずれかに記載の不織布。（１１）（１）～

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（１０）項のいずれかに記載の不織布と、他の不織布，フィルム，パルプシート，編物，及び織物から選ばれた少なくとも１種を積層した複合化不織布。

（１２）（１）～（１０）項のいずれかに記載の不織布と、天然ゴムエラストマーまたは熱可塑性エラストマーの群から選ばれた少なくとも１種である伸縮性部材シートとを積層した伸縮性複合シート。

（１３）（１）～（１２）項のいずれかに記載の不織布、複合化不織布または伸縮性複合シートを、一部に用いた吸収性物品。

【００１０】

【発明の実施の形態】本発明の不織布は、熱接合領域（Ｉ）と非熱接合領域（II）とからなり、熱接合領域（Ｉ）は繊維が部分的に集中して熱接着された部分を多数有し、かつ、熱接合領域（Ｉ）の繊維は圧着扁平化することなく繊維交点が熱接着されている。この、熱接合領域（Ｉ）の繊維が部分的に集中して熱接着された部分を多数有しているということは、繊維ウェッブの任意の部分に熱風を通して形成された熱接合領域（Ｉ）において、その構成繊維の低融点成分の溶融により繊維同士の交点や接触部分等が不規則に多数接合接着されている状態をいう。

【００１１】また、熱接合領域（Ｉ）の繊維が圧着扁平化することなく繊維交点が熱接着されているということは、熱接合領域（Ｉ）の構成繊維が、前記の従来技術にあるような熱エンボスロール等との接触によって加熱，加圧されて、その形状を扁平化し、低融点成分や高融点成分が溶融あるいは軟化して繊維同士が圧着接着するような状態ではなく、ほぼ繊維ウェッブの形態を保持したままで多数の繊維交点等が、その低融点成分の溶融または軟化によって接合接着されている状態をいう。非熱接合領域（II）とは、熱接合領域（Ｉ）以外の部分であり、構成繊維同士が熱接着されていない領域をいう。

【００１２】本発明の不織布に形成されている熱接合領域（Ｉ）は、俯瞰的に見た場合、規則的に分布しており、一定のパターンを有している場合が多い。同様なことは、不織布の厚み方向についても言うことができる。熱接合領域（Ｉ）において、熱融着性複合繊維同士の繊維交点は、熱接着され、また混綿された非熱融着性繊維同士の繊維交点は、当然の事ながら熱接着されない。

【００１３】しかし、熱融着性複合繊維と非熱融着性繊維の繊維交点は、どうなっているかと言うことになるが、その場合、使用される繊維の種類によって熱接着されている場合もあり、そうでない場合もある。しかし、熱接合領域（Ｉ）では、不織布としての強度を維持する必要があるため、繊維交点の大部分は熱接着されている必要があり、そのため混綿される非熱融着性繊維の混綿量を制限する必要がある。熱融着性繊維を主体とするというのはこのような点を考慮したものであり、好ましくは非熱融着性繊維の混綿量は３０重量%未満である。

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【００１４】また、熱接合領域（Ｉ）以外の部分が非熱接合領域（II）となるが、加工方法や加工条件により、熱接合領域（Ｉ）の周辺に、若干の熱接合領域（Ｉ）と非熱接合領域（II）が混在した領域が形成される場合、すなわち小面積の熱接合領域（Ｉ）と非熱接合領域（II）が相接して存在する場合もある。このようなきめの細かい配慮も用途によっては必要になる場合もあるからである。

【００１５】熱接合領域（Ｉ）の形状は、熱融着性複合繊維からなる繊維ウェッブを熱風が通過する方法に依存され、長方形や菱型等も良いが、好ましくは円形である。さらに好ましくは、不織布強力が向上するように繊維流れ方向に対して直角方向に長径を持つ楕円形状であるが、これに限定されるものではない。熱接合領域（Ｉ）の大きさは、前記の面積率と加工法を考慮しなければならないが、円形の場合、１～４ｍｍφ程度が好ましい。また、その配置は千鳥模様が好ましいが、これに限定されるものではない。本発明の不織布の目付は、構成繊維の繊維径にもよるが、５～６０ｇ／ｍ²が好ましく、より好ましくは、１５～５０ｇ／ｍ²であり、さらに好ましくは１５～３０ｇ／ｍ²である。目付を５ｇ／ｍ²以上とすると、取り扱いが非常に容易になり、また不織布の強度も向上し、実用性に富んだ不織布となる。６０ｇ／ｍ²以下の目付の場合は、不織布の構成繊維の密度が下がるために非熱接合領域（II）の部分でも繊維の自由度が増し、加工適正も向上し、柔軟性が高まる。また、吸収性物品に用いるには、低コスト軽量化の点でも有効である。

【００１６】本発明をさらに図面を用いて詳細に説明する。図１は、熱融着性複合繊維が圧着扁平化することなく、集中的に熱接着された部分を多数有する熱接合領域（Ｉ）と非熱接合領域（II）からなる、本発明の不織布の一つの実施例を示す全体平面図である。規則的に千鳥模様で熱接合領域（Ｉ）が円形に形成されている。

【００１７】図２は、図１のX_1-X_1'面における断面図であり、濃い網掛け部分が熱接合領域（Ｉ）である。図３は、熱接合領域（Ｉ）を楕円形に形成したもので、図４は、長方形に形成したものである。

【００１８】また、図５は、図１の熱接合領域（Ｉ）付近の拡大図で、熱接合領域形成に際して熱風を使用するために、熱接合領域（Ｉ）と非熱接合領域（II）との境界に、熱接合領域（Ｉ）と非熱接合領域（II）を混在する部分３が存在する。図６は、図２の熱接合領域（Ｉ）付近の断面拡大図で、図５と同様に、熱接合領域（Ｉ）と非熱接合領域（II）と混在する部分３が存在する。また、熱接合領域（Ｉ）は集中して熱風が通過するため、非熱接合領域（II）に比べ、若干の比容積の低下が見られる場合がある。図７は、本発明の不織布を用いた吸収性物品の一つの実施例を示す全体平面図であり、図８は、図７のX_2-X_2'面での断面図である。図９は、本

発明の不織布を用いた吸収性物品の一つの実施例を示す図であり、（ａ）がその全体平面図で、表面材９で覆われている。（ｂ）は（ａ）のX，－X，' の断面図で表面材９とティッシュペーパー１２で包まれた吸収層１０とバックシート１１から構成されている。

【００１９】本発明の不織布は、熱融着性複合繊維からなる繊維ウェッブの任意の部分に低風速の熱風を通し、集中的に熱接着された部分を多数有する熱接合領域（Ｉ）を形成するものであるが、その形成の方法としては、簡易的に通常の熱風加工機（サクションバンドドライヤー）を使用することができる。一般的に熱風加工機は、一定の温度の熱風を自走式のコンベアネットに吹き付けながら、コンベアネットの下から吸引するもので、熱融着性複合繊維を嵩高の不織布に加工するのに適している。本発明の不織布の比較的少量のサンプルの場合、繊維ウェッブの嵩をできるだけ潰さないようにするためのスペーサーを入れて、任意の孔を開けた多孔部材（例えばパンチングボード）で挟んで低風速の熱風で処理することで得られる。この多孔部材の材質は、熱風処理時に耐熱性を有するものであれば特に限定されないが、鉄、ステンレス、アルミニウム等の汎用性の金属板に孔を開けた部材を用いるのが一般的である。その他、熱風加工機のコンベアを多孔タイプにして、その上に繊維ウェッブをのせて熱風で処理する方法や、または、多孔タイプのコンベア上下で繊維ウェッブを挟んで熱風で処理する方法等があるが、これらに限定されるものではない。

【００２０】熱風加工機で加工する場合、熱風は、繊維ウェッブを構成する熱融着性複合繊維の鞘成分の樹脂を軟化または溶融させるに必要かつ十分な熱量を持ち、かつ、繊維ウェッブの嵩高性を損なわないように、低い風速であることが好ましい。熱風の風速は、繊維ウェッブの目付、多孔部材に開けられた孔の面積率、熱風処理の速度や熱風の熱量を考慮して設定されるが、０．５ｍ／ｓｅｃ～２０ｍ／ｓｅｃ程度が好ましい。つまり、本発明の不織布を得るには、集中的に熱接着された部分が、大幅に嵩を減じるような方法、処理条件は好ましくない。また、熱接合領域（Ｉ）の形状、大きさ、配置は多孔部材によって容易に変更が可能である。熱接合領域の形状は、繊維ウェッブを熱風が通過する方法に依存されるが、パンチングボードを使用した場合は、その孔形状でほぼ決定される。好ましくは円形で、さらに好ましくは、不織布強力が向上するように繊維流れ方向に対して直角方向に長径を持つ楕円形状であるが、これに限定されるものではない。

【００２１】このように本発明の不織布には、熱接合領域（Ｉ）と非熱接合領域（II）が形成され、非熱接合領域（II）は構成繊維同士が熱接着されていないため繊維の動きの自由度が高く、また、熱接合領域（Ｉ）であっても、構成繊維が圧着扁平化していないので、ある程度の動きの自由度を有している。従って、不織布全域で優れた柔軟性が発現する。また、優れた伸長性が発現させることもでき、伸縮性部材シートと貼り合わせた時に、その伸長に追随するに必要とされる１００％以上の不織布伸度が可能となる。

【００２２】本発明の不織布を高伸度不織布とするためには、熱接合領域（Ｉ）の面積の全体に対する面積率（１００×（Ｉ）／（（Ｉ）＋（II））は２５～８０％が好ましく、さらに好ましくは、３０～５０％である。この面積率が２５％以上である場合、熱接合領域（I）が多くなり、不織布強度が高くなり伸度も向上し、実用性に富んだ不織布となる。また、この面積率が８０％以下の場合は、不織布の非熱接合領域（II）が多くなるため不織布の構成繊維の自由度が増し、伸度が高くなり、かつ、柔軟性に優れたものとなり、好ましい。熱接合領域（Ｉ）の形状、大きさ、配置の変更と同様に、その面積率も多孔部材によって容易に変更が可能である。

【００２３】本発明の不織布を構成する熱融着性複合繊維には、ポリエチレンテレフタレートなどのポリエステル系繊維、ポリエチレン，ポリプロピレンなどのポリオレフィン系繊維、ナイロン６，ナイロン６６などのポリアミド系繊維、ポリアクリロニトリルなどのアクリル系繊維が使用できる。特に例えば、ポリエチレン／ポリエチレンテレフタレートで構成されるポリエステル系の鞘芯型，偏芯型などの熱融着性複合繊維、ポリエチレン／ポリプロピレンで構成されるポリオレフィン系の鞘芯型，偏芯型などの熱融着性複合繊維など、およびこれらが主体となって混繊したもので構成されるのが好ましい。特に、高い伸長性を持った高伸度不織布を得ようとする場合、比較的繊維の剛性が高く、不織布が嵩高になって伸長時に適度な伸び止まり感が出やすい、ポリエチレン／ポリエチレンテレフタレートで構成されるポリエステル系の鞘芯型，偏芯型などの熱融着性複合繊維を用いることが好ましい。また、不織布に高い柔軟性を持たせることを目的とする場合、好ましくは、比較的繊維として柔軟で、軽く、熱処理が容易な、前記ポリオレフィン系の鞘芯型熱融着性複合繊維を主体とした短繊維を用いて、カード法で繊維ウェッブを形成するのが良いが、これに限定されるものではない。

【００２４】本発明の不織布を構成する熱融着性複合繊維は、低融点成分と高融点成分からなるが、低融点成分の樹脂と高融点成分の樹脂との融点差は１０℃以上を有する組み合わせが熱融着性効果の点からも好ましい。本発明の不織布に短繊維が用いられる場合は、カード法やエアレイド法等により繊維ウェッブが形成され、長繊維が用いられる場合は、スパンボンド法等により繊維ウェッブが形成される。また、これらの繊維ウェッブ形成時に、嵩高性の向上等を目的として、単成分の繊維や中空繊維等を混繊させてもよい。本発明でいう混繊とは、長

繊維同士の混繊と短繊維同士の混綿とを含んでいる。

【００２５】本発明の不織布の繊維流れ方向（以下ＭＤ方向と表記する）に直角な方向（以下ＣＤ方向と表記する）の不織布強伸度を測定すると、他の不織布と同様に最大強度付近で、熱接着部分の大量の剥離，破壊等による応力の大きな変動が起き、強伸度曲線（以下Ｓ－Ｓカーブと表記する）にも明確に表れるが、特に本発明の不織布の場合は、最大強度付近に到るまでに伸長応力に波形状の変動が起きる。この現象は、最大強度に対して４０％～６０％に相当する応力部分に顕著であって、不織布のＳ－Ｓカーブから波形変動を読みとることができる。これは、集中的に熱接着された部分を多数有する熱接合領域（Ｉ）と非熱接合領域（II）とを併せ持つために起こる現象である。つまり、不織布強伸度の測定の初期の時点では、非熱接合領域（II）が伸ばされ、熱接合領域（Ｉ）と合わせて強度を保持しているが、最大強度に対して４０％～６０％に相当する応力部分では、非熱接合領域（II）に引っ張られる形で、規則的に形成されている熱接合領域（Ｉ）の、熱接着された繊維交点が徐々に剥離等を起こしながら不織布強度の数値を上げていき、応力に波形の変動をもたらすからである。

【００２６】このように本発明の不織布のＣＤ方向のＳ－Ｓカーブにおいて、最大強度の４０％～６０％に相当する応力部分で、波形の応力変動が見られるが、その応力変動率は、２．０％以上になるのが好ましい。これは、２．０％以上の応力変動率になった場合、集中的に熱接着された部分を多数有する熱接合領域（Ｉ）と非熱接合領域（II）が不織布内に形成され、充分な柔軟性が得られるからである。逆に、２．０％を大きく下回る変動率であると、非熱接合領域（II）が少なくなり、硬い不織布となって柔軟性が失われる。

【００２７】不織布の柔軟性を測定する方法として、ドレープ係数が代表的である。この方法は、ＪＩＳ　Ｌ１０９６のG法として定められている。ドレープ係数は、不織布のドレープ性を測定するもので、円柱状の台の上に不織布を広げてのせて、投影面積を測定するものでドレープ性が高い程、その数値が小さくなる。前記のように、本発明の不織布には、熱接合領域（Ｉ）と非熱接合領域（II）が形成されていて、非熱接合領域（II）は構成繊維同士が熱接着されていないため繊維の自由度が高く、また、熱接合領域（Ｉ）であっても、構成繊維が圧着扁平化していないので、ある程度の自由度を持ってる。従って、不織布全域で優れた柔軟性が発現し、高い柔軟性を示す数値である「０．５」以下とすることができる。不織布の嵩高性を表す数値として比容積を算出する。この数値が高ければ、その不織布は低密度で嵩高いものであると言える。

【００２８】本発明の不織布は、熱融着性複合繊維を主体としているため、他素材と接合あるいは接着や、組み合わせといった複合化が熱接着等で容易にできる。吸収性物品を始めとする使用形態の目的に応じて、他の不織布，フィルム，パルプシート，編物，及び織物などから選ばれた少なくとも１種と積層し、より多機能な複合化不織布となり得る。

【００２９】また、このような本発明の不織布または、複合化不織布が吸収性物品に効果的に配置されることにより、従来の技術では得られなかった嵩高で優れた柔軟性が付与され、風合が良好な吸収性物品を提供することが可能になる。使い捨ての紙おむつの場合、本発明の不織布を表面材として、ティッシュペーパーで包まれたパルプ集合体を吸収層、ポリエチレンフィルムをバックシートとして積層し、熱接着等で一体化されたものが例示できる。この場合、使い捨て紙おむつの装着者に直接触れる部分である表面材として、本発明の不織布は、嵩高で優れた柔軟性によって、高風合なクッション性があり、また、装着時のよれや折れに対して、不規則な折り山（ツノ）が発生せず、表面材のみが浮いたりせず、常に一体化した吸収性物品として、装着者に不快感を与えず、かつ、吸収性物品としての性能を発揮できる。

【００３０】本発明の不織布と貼り合わされる伸縮性シートは、天然ゴムエラストマーと熱可塑性エラストマーの群から選ばれた少なくとも１種であって、具体的には、天然ゴム、各種合成ゴム、例えばポリエチレンテレフタレートｰblockｰポリテトラメチレングリコール、ポリブチレンレテフタレートｰblockｰポリテトラメチレングリコールであるポリエステル系エラストマーからなる不織布やフィルムがある。また、ポリエーテルーエステルポリオールよりなるポリウレタン系エラストマーや、エチレン酢酸ビニルを配合したエチレンプロピレンゴムであるポリオレフィン系エラストマーからなる不織布やフィルムがある。伸縮性シートが不織布である場合は、一般的にメルトブロー法による不織布が多く、その他、スパンボンド法やフラッシュ紡糸法等の不織布でも良く、特に限定されない。必要な強力、伸縮率、耐熱耐光性、耐薬品性等を考慮して選択すれば良い。

【００３１】伸縮性複合シートを形成するための、不織布と伸縮性シートの貼り合わせは伸縮性シートを伸長させない状態で、合成樹脂系の接着剤で行うことができる。例えば、ポリオレフィン系、エチレン酢酸ビニル系やアクリル系等を主成分とする接着剤があるが、特に限定はされない。接着剤の塗布は点状で行うことが高伸度不織布の伸長を生かすためにも好ましく、点（塗布の大きさ）は１ｍｍ以下で熱接合領域（Ｉ）に合わせて塗布することが好ましいが、これに限定されるものではない。貼り合わせる本発明の不織布は、伸縮性シートへの伸長追随性が高いために従来のように貼り合わせる際に伸縮性シートを伸長した状態ではなく、伸長前の状態で貼り合わせることが可能である。よってプリーツしわができないため、見栄えも良好で、装着者との接触によるかぶれ等のおそれも少なくなる。

【００３２】パンツタイプの子供用の使い捨ての紙おむつの場合、本発明の不織布と、天然ゴムエラストマーと熱可塑性エラストマーの群から選ばれた少なくとも１種である伸縮性部材シートと貼り合わせて、腰回りの伸縮部材に配置されたものを例示できる。この場合、使い捨て紙おむつの装着者に直接触れる部分である部材として、本発明の不織布は、嵩高で優れた伸長性に加え、高風合なクッション性があるため、装着時の紙おむつの伸びに対して、充分に伸長し、容易に安全に装着できる。見栄えも良くなり、通常のパンツに近いものとして、自我を意識し始めた子供にも配慮できる。

【００３３】本発明者らは、市販のパンツタイプの子供用の紙おむつを多数分析し、その腰回りの伸縮性部材の伸長性を調査した結果、１００％の伸長があれば良いということを見いだした。また、伸長性は伸びすぎても不適切であり、伸長が２００％を越える状態では伸びに対する不安感がある場合もあることも見いだした。本発明の不織布は１００％以上の伸長性を持ち、自然な伸び止まり感があり、加えて、生産性も良く、安全な素材で、嵩高で風合いも良好であるため、実用性が非常に高いことが確認できた。

【００３４】さらに、本発明の伸度（Ｅ％）、強度（Ｓ kgf/5cm）及び嵩高さ（比容積、Ｖcm³/g）を同時に満足する不織布として上記変数が以下の関係式を満たす範囲が好ましい（表２参照）。この式の意味は、本発明に係る不織布は伸度、強度、嵩高さを同時に高いレベルに維持すると共に、伸度は特に重要であるため、これのみを２乗したのである。

$SE^2V \geqq 2.70 \times 10^5$

【００３５】本発明の不織布を、子供用だけでなく、大人用の紙おむつの腰回りの伸縮部材としても例示できる。その他、通常の吸収性物品の横漏れ防止のサイドギャザーとして、スパンボンド不織布や、スパンボンド不織布（Ｓ）とメルトブロー不織布（Ｍ）とを一体化させたＳＭ不織布、または、スパンボンド不織布／メルトブロー不織布／スパンボンド不織布の構造で一体化させたＳＭＳ不織布と、本発明の不織布とを貼り合わせた複合化不織布を例示できる。この場合、スパンボンド不織布やＳＭ不織布またはＳＭＳ不織布によって、不織布強度やバリア性を補い、本発明の不織布が、吸収性物品の装着者の股まわりに柔軟性とクッション性に富んだ密着感を提供できる。

【００３６】本発明の不織布が、使い捨ての紙おむつや生理用ナプキン、吸収シート等の吸収性物品の表面材として配置される場合、速やかな液透過性を有していることが好ましく、その液透過性が不足している場合などは、界面活性剤などによる化学的繊維表面改質を施して液透過性を付与することが好ましい。本発明の不織布が、腰回りの伸縮部材やサイドギャザー等の撥水性または疎水性が必要な部材に配置される場合は、本発明の不織布が高い撥水性または疎水性を有していることが好ましく、その撥水性または疎水性が不足している場合などは、界面活性剤などによる化学的繊維表面改質を施して撥水性または疎水性を付与することが好ましい。

【００３７】

【実施例】本発明を実施例により詳細に説明するが、本発明はこれらの実施例に限定されるものではない。以下に評価方法と評価手順を示す。

【００３８】（１）不織布強伸度と応力変動率

ＪＩＳ法のＬ１９０６で規定する引張り試験に準拠して、不織布の強伸度を測定する。測定サンプルは、不織布の繊維並び方向に垂直な方向（ＣＤ方向）を長手方向として１５０ｍｍ×５０ｍｍにカットしたものを使用する。

（手順）島津製作所製「オートグラフＡＧ５００Ｄ」を用いて、下記の条件で、不織布強伸度を測定し、Ｓ－Ｓカーブチャートを得る。

引張速度１００ｍｍ／ｍｉｎ

つかみ幅１００ｍｍ

Ｓ－Ｓカーブのチャート出力　Ｘ軸（伸度方向）：０．５％／ｍｍ　Ｙ軸（強度方向）：４ｇ／ｍｍ

Ｓ－Ｓカーブから、最大強度の４０％に当たるＳ－Ｓカーブ上のポイントと、６０％に当たるポイントを直線で結び、波形変動の有無を確認する。波形変動が有る場合、その直線上の応力値（ｋ）からの応力の最大変動値（Δｋ）を読みとり、下記の式に従って、応力に対する割合である応力変動率（ｆ）を算出する（単位：％）。

$f = \Delta k / k \times 100$

【００３９】（２）ドレープ係数

この測定では次の備品を用いた。

❶ドレープ台：直径６４ｍｍ，高さ１００ｍｍ，重量７６ｇの、鞘成分がポリエチレンで芯成分がポリプロピレンの熱融着性複合繊維を使用した円柱状の成形体。

❷おもり：直径６４ｍｍ，重量２ｇ

❸ＣＣＤカメラ：Ｉｋｅｇａｍｉ製「ＦＣＤ－１０」

測定サンプルは、直径２０．８ｍｍの円形にカットしたものを使用する。

【００４０】（測定手順）ＪＩＳ　Ｌ１０９６　Ｇ法（ドレープ係数）に準拠する。測定サンプルを、ドレープ台の上にのせる（この時、お互いの中心を合わせるようにする）。おもりを測定サンプルの上に置く（同様に、おもりの中心を測定サンプルとドレープ台の中心に合わせるようにする。）この状態まま、全体を３回上下させた後、１分間放置する。その後、ＣＣＤカメラを使用して真上からの投影面積を測定する。一つのサンプルにつき、表と裏を測定し、その平均値を求め、下記の式に従ってドレープ係数Ｄを算出する。この時、真上からの投影面積をＡｄ，ドレープ台の面積をＳ１，測定サンプルの面積をＳ２とする。ドレープ係数Ｄは、１．０に近づけば硬く、０に近づくほどドレープ性が高いと言え

る。
D＝（Ａｄ－Ｓ１）／（Ｓ２－Ｓ１）
【００４１】（３）面積率
不織布の表面を観察して、構成繊維が部分的に集中して熱接着されている熱接合領域（Ｉ）の面積を測定し、測定サンプル全面積に対する面積率を算出する。測定サンプルは、１００ｍｍ×１００ｍｍにカットしたものを使用する。
（測定手順）ＯＭＲＯＮ社「３Ｄ　Ｄｉｇｉｔａｌ　Ｆｉｎｅ　Ｓｃｏｐｅ　ＶＣ２４００－ＩＭＵ　Ｖｅｒ．２．３」を使用して、測定サンプルの表裏を観察し、熱接合領域（Ｉ）の面積を測定する。表裏の平均値を算出する（％）。
【００４２】（４）比容積
比容積ｖを下記の式に従って算出する（単位：ｃｍ³／ｇ）。不織布の目付をｗ（ｇ／ｍ²）とし、東洋精機製の「デジシックネステスター」を使用して、荷重２ｇ／ｃｍ²、測定速度２ｍｍ／ｓｅｃの条件で測定した不織布の厚みをｔ（ｍｍ）とする。
ｖ＝ｔ／ｗ×１０００
【００４３】実施例１
鞘の成分が融点１３０℃のポリエチレン、芯の成分が融点１６２℃のポリプロピレンである熱融着性複合繊維であって、その繊度は２デニール／フィラメント，カット長は５１ｍｍのものを構成繊維とし、カード法によって繊維ウェッブとした。この繊維ウェッブをコンベアネットにのせ、高さ１．０ｍｍのスペーサーで囲み、直径３ｍｍの円形の孔が２ｍｍ間隔で千鳥配列に開けられたパンチングボードで覆った状態のまま、ＫＯＴＯＢＵＫＩ　Ｃｏ．，Ｌｔｄ．製「ＤＢ－１８２タイプ」熱風加工機を使用して、加工温度１４０℃，加工時間１２ｓｅｃ，風速１．２ｍ／ｓｅｃの条件で熱風を通し、目付２５ｇ／ｍ²の図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００４４】実施例２
鞘の成分が融点１３０℃のポリエチレン、芯の成分が融点２５３℃のポリエチレンテレフタレートである熱融着性複合繊維であって、その繊度は２デニール／フィラメント，カット長は５１ｍｍのものを構成繊維とし、加工温度を１３８℃とした以外は、前記の実施例１と同様にして、図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００４５】実施例３
鞘の成分が融点１３８℃のコポリマーポリプロピレン、芯の成分が融点１６２℃のポリプロピレンである熱融着性複合繊維であって、その繊度は１．８デニール／フィラメント，カット長は３８ｍｍのものを構成繊維とし、加工温度を１４５℃とした以外は、前記の実施例１と同様にして、図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００４６】実施例４
繊維ウェッブを覆うパンチングボードを、長径４．０ｍｍ、短径２．０ｍｍの楕円形の孔が、長径をＣＤ方向に向け、長径方向に１．５ｍｍ、短径方向に２ｍｍ間隔で千鳥配列に開けられたものになった以外は、前記の実施例１と同様にして、図３に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００４７】実施例５
前記の実施例４で使用したパンチングボードを用いた以外は、実施例２と同様にして、図３に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００４８】実施例６
前記の実施例１と同様にして、目付５０ｇ／ｍ²の図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００４９】実施例７
融点１２９℃のポリエチレンと融点１６４℃のポリプロピレンを組み合わせてスパンボンド法で複合紡糸して、鞘芯型の熱融着性複合長繊維ウェッブを得た。その繊度は１．０デニール／フィラメントであった。得られた長繊維ウェッブを前記の実施例１と同様にして、目付５ｇ／ｍ²の図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する長繊維不織布を得た。
【００５０】実施例８
鞘の成分が融点１３０℃のポリエチレン、芯の成分が融点１６２℃のポリプロピレンである熱融着性複合繊維であって、その繊度は２デニール／フィラメント，カット長は５１ｍｍのものに、融点が１６２℃であるポリプロピレン繊維で、その繊度が２デニール／フィラメント，カット長は４０ｍｍものを１５ｗｔ％混綿し、これを構成繊維とした以外は、前記の実施例１と同様にして、図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００５１】実施例９
前記の実施例１と同様にして、目付７０ｇ／ｍ²の図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布を得た。
【００５２】実施例１～９の不織布を、測定方法に従ってカットし、測定サンプルを作成した。これらの測定サンプルを用いて、ＣＤ方向の不織布強伸度測定を行い、その測定結果から、Ｓ－Ｓカーブの最大強度の４０％から６０％に相当する部分における波形変動の有無を確認した。波形変動が見られた場合は応力変動率を測定した。また、ドレープ係数、比容積を測定した。その結果を表１に示す。
【００５３】比較例１
パンチングボードとスペーサーを使用しないで、繊維ウェッブの全体に、加工温度１３３℃，加工時間１２ｓｅｃ，風速０．８ｍ／ｓｅｃの条件で熱風を通した以外

は、前記の実施例１と同様にして、ほぼ全体が熱接合した不織布を得た。

【００５４】比較例２

バンチングボードとスペーサーを使用しないで、繊維ウェッブの全体に、加工温度１２９℃，加工時間１２ｓｅｃ，風速０．８ｍ／ｓｅｃの条件で熱風を通した以外は、前記の実施例２と同様にして、ほぼ全体が熱接合した不織布を得た。

【００５５】比較例３

バンチングボードとスペーサーを使用しないで、繊維ウェッブの全体に、加工温度１４２℃，加工時間１２ｓｅｃ，風速１．２ｍ／ｍｉｎの条件で熱風を通した以外は、前記の実施例３と同様にして、ほぼ全体が熱接合した不織布を得た。

【００５６】比較例４

実施例１と同じ構成繊維を用いて、カード法により目付２５ｇ／ｍ²の繊維ウェッブを得た。この繊維ウェッブをコンベアネットにのせ、スペーサーを使用しないで実＊施例１と同じバンチングボードで覆い、孔径０．７ｍｍのノズルを用いて、バンチングボードの孔ごとに１３０℃の熱風を風速２００ｍ／ｍｉｎで１秒間噴出させ、コンベアネットの裏側で吸引しながら、繊維ウェブに熱処理を施した。しかし、バンチングボードの孔部分のウェッブが一部分飛散し、穴が開いた状態になった。また、残った接着部分も風圧に潰され圧着されており、測定サンブルとするには不適切なものであった。

【００５７】比較例１～３の不織布を、測定方法に従ってカットし、測定サンブルを作成した。これらの測定サンブルを用いて、ＣＤ方向の不織布強伸度測定を行い、その測定結果から、Ｓ－Ｓカーブの最大強度の４０％～６０％にあたる部分における波形変動の有無を確認し、波形変動が見られた場合は応力変動率を測定した。また、ドレープ係数、比容積を測定した。その結果を表１に示す。

【００５８】

【表１】

	目付 (g/m²)	不織布強伸度 最大強度 (kg/5cm)	伸度 (%)	波形変動の有無	波形変動率 (%)	ドレープ係数	比容積 (cm³/g)
実施例１	25	0.704	130	有り	5.0	0.39	47
実施例２	25	0.552	148	有り	3.4	0.38	75
実施例３	25	0.615	101	有り	2.8	0.37	45
実施例４	25	0.784	110	有り	4.2	0.43	40
実施例５	25	0.698	122	有り	3.0	0.41	73
実施例６	50	0.881	120	有り	2.5	0.49	36
実施例７	5	0.398	101	有り	2.0	0.29	10
実施例８	25	0.609	138	有り	3.6	0.32	42
実施例９	70	0.912	89	有り	1.6	0.69	26
比較例１	25	0.614	40	無し	―	0.89	52
比較例２	25	0.562	68	無し	―	0.87	80
比較例３	25	0.645	37	無し	―	0.91	50

【００５９】表１に示される評価結果について考察する。実施例１と比較例１を比較した場合、同じ熱融着性複合繊維を使用した不織布で、不織布強度や比容積の数値がほぼ等しく、同等の嵩高性を持ちながら、実施例１は、ドレープ係数の数値が低く、柔軟性に優れているのがわかる。

【００６０】実施例２と比較例２、実施例３と比較例３の比較でも同様で、実施例２，３の不織布の柔軟性が優れているのがわかる。また、表１の結果から、比較例１～３はＳ－Ｓカーブにおいていずれも波形変動が認めれず、本質的に本発明の不織布のように、熱接合領域（Ｉ）と非熱接合領域（II）が存在しない異質の物性を示すことがわかる。

【００６１】実施例４と実施例５で、部分的に集中して熱接着された部分を多数有する熱接合領域（Ｉ）の形状をＣＤ方向に延ばして、不織布強度を向上させたが、その柔軟性は維持されており、形状や加工条件等を様々に変更することで多様なニーズに合致した不織布を提供できることがわかる。

【００６２】実施例６と実施例７は不織布の目付が５～６０ｇ／ｍ²の範囲で効果が高いことを示している。実施例１と実施例６は、実施例９と同じ熱融着性複合繊維を使用した不織布であるが、目付を６０ｇ／ｍ²以下としたことによって、比容積が著しく高くなり、ドレープ係数も小さくなって柔軟性が向上する。従って、６０ｇ／ｍ²以下の目付は非常に好ましいと言える。

【００６３】実施例８の場合は、単成分の短繊維を混綿した不織布であるが、さらに柔軟性が向上しているのがわかる。これにより、熱融着性複合繊維を主体として、他の単成分の繊維や中空繊維等などを混繊してさらに多機能な不織布とし、これを提供できることがわかる。

【００６４】これらより、実施例１～８の不織布が、特に柔軟性に優れており、また、汎用性、応用性が高いものであることがわかる。

【００６５】実施例１０

実施例８と同じ構成繊維の繊維ウェッブに、実施例７と

同じ構成繊維の長繊維ウェッブを積層し、前記の実施例１と同様にして、図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する複合化不織布を得た。この複合化不織布は、カード法によって形成された繊維ウェッブの持つ高高さを生かしながら、スパンボンド法による長繊維不織布の高不織布強力を併せ持ち、かつ、優れた柔軟性があった。

【００６６】実施例１１

鞘の成分が融点１３０℃のポリエチレン、芯の成分が融点１６２℃のポリプロピレンである、繊度２デニール／フィラメント及びカット長５ｍｍの熱融着性複合繊維が３０重量％と、パルプが７０重量％を構成繊維として形成されたエアレイド不織布（８０ｇ／ｍ²）の上に、前記の実施例１と同じ構成繊維の繊維ウェッブを積層し、実施例１と同様にして複合不織布を得た。この複合不織布は、厚みがあるが、折り曲げに対して不規則な折り山（ツノ）が発生せず、柔軟性があり、かつ、クッション性に富んだものであった。また、エアレイド不織布の不織布表面を、実施例１と同等の図１に示すような熱接合領域（Ｉ）と非熱接合領域（II）を有する不織布でカバーしてあるため、触りが良くなった。

【００６７】このように実施例１０と実施例１１から、本発明の不織布は、熱処理で容易に他の不織布等と積層することができる上、複合不織布としても、その柔軟性を損なわず、複合化の相手が持つ特質，特徴を生かし、より高機能な複合化不織布となることがわかる。

【００６８】実施例１２

実施例１の不織布を表面材とし、その下層に吸収層としてティッシュペーパーで包まれたパルプシート（２４０ｇ／ｍ²）を配置し、その下層にポリエチレンフィルムを配置した、図９と図１０に示すような吸収性物品ａを作製した。同様の構造で、比較例１の不織布を表面材に配置した吸収性物品ｂを作製した。吸収性物品ａ，ｂについて、折り評価（全体を３つ折りにして、折れ方を評価する）、長手方向のねじり評価（全体のよれ具合を評価する）を行った。折り評価において、吸収性物品ａは折り目が目立たず、折り跡も残らなかったが、吸収性物品ｂは、不規則な折り山（ツノ）が現れ、表面材が一部浮いた状態で、折り跡が少し残った。ねじり評価で、吸収体ａは、表面材が全体によくなじんだ状態で、長手方向に比較的小さな折れが発生したが、吸収性物品ｂは、ねじりに対して表面材が浮き上がり、比較的大きな折れが発生した。

【００６９】これにより、実施例１の不織布を表面材に配置した吸収性物品ａが、柔軟性に優れており、吸収性物品として一体化して、よれや折れに対して効果的であることがわかる。

【００７０】実施例１３

鞘の成分が融点１３０℃のポリエチレン、芯の成分が融点２５３℃のポリエチレンテレフタレートである熱融着性複合繊維であって、その繊度は２デニール／フィラメント，カット長は５１ｍｍのものを構成繊維とし、カード法によって繊維ウェッブとした。この繊維ウェッブを、高さ１．０ｍｍのスペーサーで囲ってパンチングボードで覆い、ＫＯＴＯＢＵＫＩ　Ｃｏ．，Ｌｔｄ．製「ＤＢ－１８２タイプ」熱風加工機を使用して、加工温度１３８℃，加工時間１２ｓｅｃ，風速１．９ｍ／ｓｅｃの条件で熱風を通したところ、図１に示すような直径３．６ｍｍの円形の熱接合領域（Ｉ）が１．４ｍｍ間隔に千鳥配列で形成された。この不織布の目付は２２ｇ／ｍ²で、熱接合領域（Ｉ）の分布面積率が４０％であった。

【００７１】実施例１４

パンチングボードの孔径を変更して、図１に示すような直径が２．８ｍｍで間隔が２．２ｍｍの円形の熱接合領域（Ｉ）を形成した以外は、前記の実施例１３と同様にして、不織布を得た。熱接合領域（Ｉ）の面積率は２５％であった。

【００７２】実施例１５

パンチングボードの孔径を変更して、図１に示すような直径が４．５ｍｍで間隔が０．５ｍｍの円形の熱接合領域（Ｉ）を形成した以外は、前記の実施例１３と同様にして、不織布を得た。熱接合領域（Ｉ）の面積率は８０％であった。

【００７３】実施例１６

パンチングボードの孔径と孔形を変更して、図３に示すような長径４．２ｍｍ、短径３．０ｍｍの楕円形で、長径をＣＤ方向に向け、長径方向に０．８ｍｍ、短径方向に２ｍｍ間隔で千鳥配列に熱接合領域（Ｉ）を形成した以外は、前記の実施例１３と同様にして、不織布を得た。熱接合領域（Ｉ）の面積率は４０％であった。

【００７４】実施例１７

実施例１３と同じ熱融着性複合繊維に、融点が２５４℃のポリエチレンテレフタレートを成分とする繊度２デニール／フィラメント、カット長５１ｍｍの短繊維を１５ｗ％混綿しこれを構成繊維をし、パンチングボードの孔径を変更して、図１に示すような直径が４．０ｍｍで間隔が１．０ｍｍの円形の熱接合領域（Ｉ）を形成した以外は実施例１３と同様にして、不織布を得た。熱接合領域（Ｉ）の面積率は５０％であった。

【００７５】実施例１８

前記の実施例１３と同様して、目付２２ｇ／ｍ²の不織布を得た。パンチングボードの孔径を変更したため、熱接合領域（Ｉ）は、図１（ａ）に示すような、直径が２．７ｍｍで間隔が２．３ｍｍの円形であった。熱接合領域（Ｉ）の面積率は２３％であった。

【００７６】実施例１３～１８の不織布を、測定方法に従ってカットし、測定サンプルを作成した。これらの測定サンプルを用いて、ＣＤ方向の不織布強伸度測定と比容積の測定を行った。その結果を表２に示す。

【００７７】

＊　＊【表２】

	目付 (g/m²)	面積率 (%)	不織布強伸度 最大強度 (Skgf/5cm)	伸度 (E%)	比容積 (Vcm³/g)	SE²V (×10⁶)
実施例１３	22	40	0.700	147	61	9.22
実施例１４	22	25	0.404	104	63	2.75
実施例１５	22	80	0.908	101	54	5.00
実施例１６	22	40	0.811	137	62	9.44
実施例１７	22	50	0.591	123	73	6.53
実施例１８	22	23	0.362	89	62	1.78
比較例５	22	100	1.169	68	49	2.65
比較例６	30	0	0.800	71	25	1.01

【００７８】比較例５

バンチングボードやスペーサーを使用しないで、繊維ウェッブの全体に、加工温度１３３℃，加工時間１２ｓｅｃ，風速１．５ｍ／ｓｅｃの条件で熱風を通した以外は、前記の実施例１３と同様にして、ほぼ全体が熱接合した不織布を得た。熱接合領域（Ｉ）の面積率はほぼ１００％であった。

【００７９】比較例６

融点が２５４℃のポリエチレンテレフタレートを成分とする繊度２デニール／フィラメント、カット長５１ｍｍの短繊維を使用し、カード法を用いて繊維ウェッブとしたものに、ウォーターニードル加工を施して、繊維が互いに交絡した目付が３０ｇ／ｍ²の不織布を得た。ウォーターニードル加工は、ノズル径０．１ｍｍ、ノズルピッチ１．０ｍｍのノズルを使用し、コンベア速度２０ｍ／ｍｉｎで２０ｋｇ／ｃｍ²の水圧で２回予備処理した後、５０ｋｇ／ｃｍ²の水圧で４回交絡処理した。

【００８０】比較例５と比較例６の不織布を、測定方法に従ってカットし、測定サンプルを作成した。これらの測定サンプルを用いて、ＣＤ方向の不織布強伸度測定と比容積を測定した。その結果を表２に示す。

【００８１】表２に示される評価結果について考察する。実施例１３と比較例５を比較した場合、同じ熱融着性複合繊維を使用した不織布で、不織布強度や比容積の数値がほぼ等しく、同等の嵩高性を持ちながら、実施例１３は不織布伸度が大きく、伸長性に優れていることは明らかである。

【００８２】実施例１４と実施例１５は不織布の熱接合領域（Ｉ）の分布面積率が２５～８０％の範囲で伸度が大きいことを示している。これらの実施例を実施例１８と比較すると、実施例１３と同じ熱融着性複合繊維を使用した不織布の場合、熱接合領域（Ｉ）の分布面積率が２５％以上になると不織布強度が著しく向上し、それに伴って不織布伸度も向上している。従って、熱接合領域（Ｉ）の分布面積率が２５％以上、８０％以下のものは特に好ましい。

【００８３】実施例１６は、部分的に集中して熱接着された部分を多数有する熱接合領域（Ｉ）の形状をＣＤ方向に延ばして、不織布強度を向上させたが、その伸長性は維持されており、熱接合領域（Ｉ）の形状や加工条件等を様々に変更することで多様なニーズに合致した高伸度不織布を提供できることがわかる。

【００８４】実施例１７の場合は、単成分の短繊維を混綿した不織布であるが、さらに嵩高性が向上しているのがわかる。これにより、熱融着性複合繊維を主体として、他の単成分の繊維や中空繊維等などを混繊してさらに多機能な不織布とし、これを提供できることがわかる。

【００８５】これらより、実施例１３～１７の不織布が、特に柔軟性に優れており、また、汎用性、応用性が高いものであることがわかる。

【００８６】実施例１９

実施例１３で得た不織布で、ポリウレタン系エラストマーからなるメルトブロー不織布を挟み込む形で、ポリオレフィン系のホットメルト剤を使用して貼り合わせ伸縮性複合シートを得た。この伸縮性複合化シートは、カード法によって形成された繊維ウェッブの持つ嵩高さによって風合いが良く、かつ、ポリウレタン系エラストマーによる伸縮性があり、かつ、優れた柔軟性があった。

【００８７】このように実施例１９から、本発明の不織布は、容易に他の不織布等と積層することができる上、伸縮性複合シートとしても、その伸縮性を損なわず、嵩高で風合いが良く、より高機能な実用性の高い伸縮性複合化シートとなることがわかる。

【００８８】実施例２０

ティッシュペーパーで包まれたパルプシート（２４０ｇ／ｍ²）を、ポリエチレンフィルムに貼り合わせて吸収層とし、実施例１９で得た伸縮性複合シートを腰まわりの伸縮材として配置して、図７と図８に示すような吸収性物品ｃを作製した。吸収性物品ｃについて、吸収性物品ｃの装着時を想定した官能伸縮性試験を行った。官能伸縮性試験は、吸収性物品ｃの腰まわり部分に両手を入

れて左右に広げ、その伸縮具合を官能的に評価した。その結果、充分な伸縮性と適度な伸び止まり感があり、また、その伸縮材が手に触れる感触が良好で、市販の紙おむつにはない高風合いなものであった。

【００８９】これにより、実施例１９の伸縮性複合シートを腰まわりの伸縮材として配置した実施例２０の吸収性物品ｃが効果的であることがわかる。

【００９０】

【発明の効果】本発明の不織布は従来得られていなかった嵩高であるとともに柔軟性、高伸度、及び強度をバランスよく有する不織布の提供を可能にしたものである。本発明の不織布と、他の不織布やエラストマーからなる伸縮性シートを積層することによって、本発明の不織布の持つ嵩高性と柔軟性、伸長性、強度に加え、その積層の相手の持つ特質，特徴を生かした、より高機能な複合化不織布や伸縮性複合化シートを提供することができる。さらに、本発明の不織布または伸縮性複合シートをその一部に配置することによって、嵩高性と優れた伸長性がある、柔軟で高風合いな吸収性物品を提供することができる。

【図面の簡単な説明】

【図１】本発明の一実施例である不織布の全体平面図である。

【図２】図１において、直線X_1-X_1'での断面図である。

【図３】熱接合領域を楕円形状に設けた本発明の一実施＊例である不織布の平面図である。

【図４】熱接合領域を長方形状に設けた本発明の一実施例である不織布の平面図である。

【図５】図１における熱接合領域付近の拡大図である。

【図６】図２における熱接合領域付近の拡大図である。

【図７】本発明の不織布を、その表面材に使用した吸収性物品の一例を示す全体平面図である。

【図８】図７における吸収性物品の直線Ｘ２－Ｘ２’での断面図である。

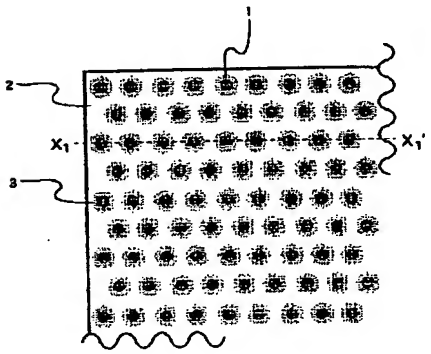
【図９】本発明の不織布を、その表面材に使用した吸収性物品の一例を示す全体平面図図である。

【図１０】図９における吸収性物品の直線X_3-X_3'の断面図である。

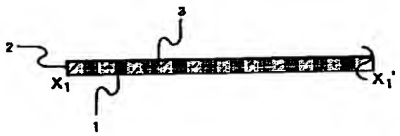
【符号の説明】

１　熱接合領域
２　非熱接合領域
３　熱接合領域と非熱接合領域が混在している部分
４　腰まわりの伸縮材
５　バックシート
６　表面材
７　サイドギャザー
８　吸収層
９　表面材
１０　吸収層
１１　バックシート
１２　ティッシュペーパー

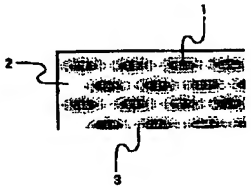
【図１】



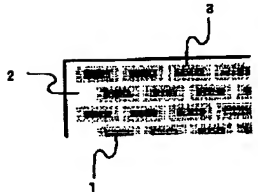
【図２】



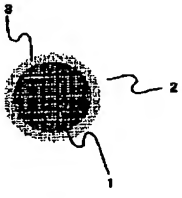
【図３】



【図４】



【図５】



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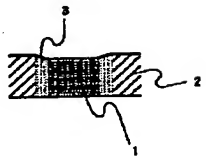

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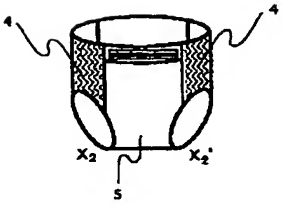

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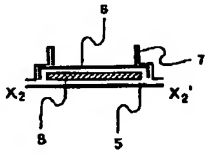

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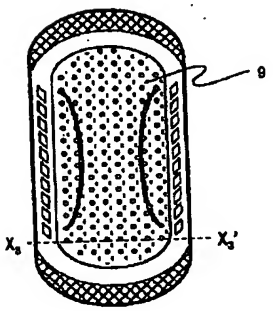

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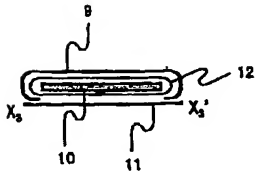

フロントページの続き

(51)Int.Cl.'	識別記号	F I	ﾃｰﾏｺｰﾄﾞ(参考)
// Ａ６１Ｆ　13/511			
13/15			

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-003253
(43)Date of publication of application : 09.01.2001

(51)Int.CI. D04H 1/54
A61F 13/53
A61F 13/49
A61F 13/46
// A61F 13/511
A61F 13/15

(21)Application number : 11-192240
(22)Date of filing : 06.07.1999

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(30)Priority
Priority number : 11115872 Priority date : 23.04.1999 Priority country : JP

(54) NONWOVEN FABRIC AND ABSORPTIVE ITEM USING THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a bulky nonwoven fabric with high flexibility or stretchability, suitable for absorptive items including sanitary goods, disposable diapers and absorptive sheets by designing the nonwoven fabric to consist mainly of specific thermofusible conjugate fibers and by forming thermobonded area and non-thermobonded area in specified proportions.
SOLUTION: This nonwoven fabric 5-60 g/cm2 in basis weight is obtained by thermobonding of a web without pressure flattening of the fiber crossover points using a hot air processing machine; in this nonwoven fabric, the web is prepared by blending thermofusible conjugate fibers as the main fibers each composed of low- melting component and high-melting component, e.g. polyethylene/polyethylene terephthalate sheath/core-type thermofusible conjugate fibers, with another kind of fibers. This nonwoven fabric thus obtained is such that the total area thereof is made up of 20-80% of thermobonded area and the rest of non-thermobonded area, the stress portion corresponding to 40-60% of the maximum strength of the strength-elongation curve rectangular to the fiber axial direction exhibits a wavy fluctuation ≥2% in coefficient of stress variation, drape coefficient is ≤0.5, elongation at break is 100-200%, and the following relationship is satisfied: $SE^2V \geq 2.70 \times 105$ [S is the maximum strength (kgf/5 cm), E is elongation at break (%), and V is specific volume (cm3/g)].

LEGAL STATUS
[Date of request for examination]
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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]

Searching PAJ

[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

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CLAIMS

[Claim(s)]
[Claim 1] It is the nonwoven fabric which makes a subject the thermal melting arrival nature bicomponent fiber which consists of a low-melt point point component and a high-melting component, and this nonwoven fabric consists of a thermal bond field (I) and a non-thermal bond field (II). Said thermal bond field (I) It is the nonwoven fabric which heat adhesion of the fiber intersection is carried out without fiber carrying out sticking-by-pressure flattening of the part by which heat adhesion is carried out with the thermal melting arrival nature bicomponent fiber, and this heat adhesion was carried out, and is characterized by a non-thermal bond field (II) being a part to which heat adhesion is not carried out.
[Claim 2] The nonwoven fabric according to claim 1 whose eyes are 5 - 60 g/m2.
[Claim 3] The nonwoven fabric according to claim 1 or 2 which the stress part which is equivalent to 40% - 60% of the maximum reinforcement in the tenacity elongation curve of the direction of a right angle to the fiber flow direction of a nonwoven fabric shows wave fluctuation.
[Claim 4] The nonwoven fabric according to claim 1 to 3 whose stress rate of change of wave fluctuation is 2.0% or more.
[Claim 5] The nonwoven fabric according to claim 1 to 4 whose drape multiplier is 0.5 or less.
[Claim 6] The nonwoven fabric according to claim 1 to 5 characterized by for the rate of area to the area of the whole nonwoven fabric of the area of a thermal bond field (I) being 25 - 80%, and whenever [breaking extension / of this nonwoven fabric] being 100% or more.
[Claim 7] The nonwoven fabric according to claim 1 to 6 whenever [breaking extension / of a nonwoven fabric / whose] is 100 - 200%.
[Claim 8] the case where set S (kgf / 5cm) and ductility to E(%), and specific volume is set to V (cm3/g) for the maximum reinforcement of a nonwoven fabric -- SE2V >=2.70x105 -- coming out -- a certain nonwoven fabric according to claim 1 to 7.
[Claim 9] The nonwoven fabric according to claim 1 to 8 whose high-melting component of a thermal melting arrival nature bicomponent fiber is polypropylene or polyethylene terephthalate.
[Claim 10] The nonwoven fabric according to claim 1 to 9 with which a nonwoven fabric consists of cotton-mixing with a thermal melting arrival nature bicomponent fiber and other fiber.
[Claim 11] The compound-ized nonwoven fabric which carried out the laminating of at least one sort chosen from a nonwoven fabric according to claim 1 to 10, other nonwoven fabrics, a film, a pulp sheet, knitting, and textiles.
[Claim 12] The elasticity compound sheet which carried out the laminating of a nonwoven fabric according to claim 1 to 10 and the elasticity member sheet which was chosen from the group of a natural rubber elastomer or thermoplastic elastomer, and whose number is at least one.
[Claim 13] Absorptivity goods which used the nonwoven fabric according to claim 1 to 12, the compound-ized nonwoven fabric, or the elasticity compound sheet for the part.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the absorptivity goods using the nonwoven fabric which made the subject the thermal melting arrival nature bicomponent fiber which has flexibility or extensibility excellent in bulky in more detail and the compound-ized nonwoven fabric using it, elasticity compound sheets and those nonwoven fabrics, or an elasticity compound sheet represented by sanitary items, a disposable disposable diaper, the absorption sheet, etc. about the compound-ized nonwoven fabric which used a nonwoven fabric and it, and the absorptivity goods using them.
[0002]
[Description of the Prior Art] In recent years, what developed more the engine performance of the absorptivity goods represented by a disposable disposable diaper and a disposable sanitary napkin, the absorption sheet, etc., and was multi-functionalized is called for with diversification of a lifestyle. For example, generally the disposable disposable diaper is equipped with the absorption layer for the liquid maintenance which consists of wood pulp cotton, cellulose cotton, cotton cotton, a rayon fiber, a high-polymer absorbent, etc. between backseats of liquid impermeability, such as facing of liquid permeability, and a polyethylene film, and said facing and backseat, in addition consists of configuration members, such as side gathers for leakage prevention.
[0003] In addition to prompt liquid permeability, facing is asked more for the comfortable feeling of use at the time of wearing by high aesthetic property among these configuration members. Moreover, side gathers are asked for flexibility and a loft in consideration of the aesthetic property at the time of sticking to the body in addition to the high barrier property which leaks neither the excreted urine nor a loose passage, adhesion which loses the clearance between the bodies as much as possible, and elasticity. The nonwoven fabric is mainly used for such a configuration member, and naturally, it multi-functionalizes, in order that a nonwoven fabric may fill such a military requirement, and high performance-ization is called for.
[0004] Generally, after a thermal melting arrival nature bicomponent fiber has a high-melting component and a low-melt point point component and is formed in fiber Webb, by heating under with the melting point of a high-melting component, it softens or fuses, the contact section between each fiber joins, and it forms a nonwoven fabric more than the melting point of a low-melt point point component. As the approach of the main heating, fiber Webb is inserted with an embossing roll etc., hot blast is sprayed on the approach of carrying out sticking-by-pressure flattening of the part, and whole fiber Webb, and softening or the approach of carrying out melting is in them about the low-melt point point component. Although the part stuck by pressure becomes hard since it is the thing to which the former approach makes fiber Webb stick by pressure partially to the military requirement as facing of absorptivity goods, it becomes the nonwoven fabric which becomes easy to bend on the boundary of a sticking-by-pressure part and the part non-stuck by pressure etc., and has a certain amount of flexibility. However, the loft of the whole nonwoven fabric will almost be lost, and since the sticking-by-pressure part was not penetrated to the liquid discharged from the bodies, such as urine and menstrual blood,

it is not desirable as facing of absorptivity goods. On the other hand, it is easy to come out of an irregular chip box crest (TSUNO) to fixed bending, and the latter approach becomes a nonwoven fabric lacking in flexibility, although there is a loft and there are also cushioning properties, since it is what lets hot blast pass, with fiber Webb's ** left. Then, from the former, hot blast was sprayed on fiber Webb and the attempt which is going to obtain the nonwoven fabric which examines the way of spraying etc. and is supple with bulky in softening or the approach of carrying out melting in the low-melt point point component has been made. For example, the approach (JP,57-47958,A) of making the heating gas of a high-pressure high speed blow off from two or more orifices through a porous member, and heat-treating is proposed. However, when it is going to obtain comparatively the nonwoven fabric of the low consistency in low eyes usually well used for the absorptivity goods represented with such a processing approach by sanitary items, a sanitary napkin or a disposable disposable diaper, the absorption sheet, etc., in order to make a heating gas blow off from two or more orifices at a supersonic wind speed from subsonic and to spray fiber Webb, fiber carries out sticking-by-pressure flattening, and there is a possibility of reducing fiber Webb's ** sharply. Moreover, there is also a possibility that a hole may open to fiber Webb by scattering of configuration fiber, at the time of blasting of hot blast.

[0005] Moreover, recently, newly many trousers type (type of which it disposes) disposable disposable diapers come to be used, and number's of the configuration members increase, and it has complicated. Since it is a type supposing equipping with such a trousers type disposable disposable diaper unlike a disposable diaper old tape type (flat type), with a wearing person standing, the elasticity which a disposable diaper has connects and turns into adhesion to a wearing person with wearing nature collectively as it is. Especially the elasticity of waist has been a more important technical problem, and the elasticity sheet with high elasticity is used for such a member. However, such an elasticity sheet does not have ** generally, although elasticity is high, and the surface state of a sheet has many things with a feeling of adhesion. Then, in order to raise aesthetic property, a nonwoven fabric is stuck (there are many laminated structures of the shape of sandwiches which put the elasticity sheet between nonwoven fabrics in this case), aesthetic property is good for such a lamination nonwoven fabric bulky, and properties, such as imitation nature to flexible material and extensibility, are searched for.

[0006] In order to fulfill the above-mentioned demand characteristics, many nonwoven fabrics which used the thermal melting arrival nature bicomponent fiber were used, and amelioration has accomplished. For example, in JP,09-117982,A, the compound sheet which comes to carry out the thermal bond of the elasticity sheet with which thermal melting arrival nature fiber consists of a nonwoven fabric which comes to carry out a confounding, and thermoplastic elastomer by roll processing is proposed. although the nonwoven fabric thermal melting arrival nature fiber comes each other to carry out a confounding has the goodness of a certain amount of aesthetic property, since [however,] a production process is complicated and can seldom gather working speed -- cost -- starting -- in addition -- and it is hard to come by the confounding of fiber out of ** of a nonwoven fabric. Moreover, in JP,09-78436,A, the nonwoven fabric which consists of synthetic resin is heated, and the extended elasticity nonwoven fabric is proposed. However, fiber is made to stick by pressure like the above using the confounding and heat embossing roll of fiber, and all reduce ** and cannot say it as a desirable thing. Moreover, since there is a possibility of we being anxious about the dry area on the front face of a nonwoven fabric by extension and fuzz, and spoiling aesthetic property, it is not desirable.

[0007] The purpose of this invention is solving the problem of the above-mentioned conventional technique. That is, it is offering a nonwoven fabric with the flexibility excellent in bulky, or is offering a nonwoven fabric with the extensibility excellent in bulky. Moreover, it is in offering the compound-ized nonwoven fabric using it, and an elasticity compound sheet. In addition, it is offering the absorptivity goods which used these nonwoven fabrics and an elasticity compound sheet for the part.

[0008]

[Means for Solving the Problem] That this invention persons should solve said technical problem, as a result of repeating examination wholeheartedly, it lets the hot blast of a low wind speed pass only into arbitration's part of fiber Webb who made the subject the thermal melting arrival

nature bicomponent fiber. By the thermal bond field (I) which has many parts by which sticking-by-pressure flattening is not carried out, and by which heat adhesion was carried out intensively, and processing it into the nonwoven fabric which has a part for non-heat jointing (II) It knows that a nonwoven fabric with the unprecedented outstanding flexibility and extensibility will be formed with a loft held, and came to complete this invention.

[0009] The nonwoven fabric of this invention consists of a configuration of the following (1) - (13).

It is the nonwoven fabric which makes a subject the thermal melting arrival nature bicomponent fiber which consists of a low-melt point point component and a high-melting component. This nonwoven fabric (1) A thermal bond field (I), It consists of a non-thermal bond field (II). Said thermal bond field (I) It is the nonwoven fabric which heat adhesion of the fiber intersection is carried out without fiber carrying out sticking-by-pressure flattening of the part by which heat adhesion is carried out with the thermal melting arrival nature bicomponent fiber, and this heat adhesion was carried out, and is characterized by a non-thermal bond field (II) being a part to which heat adhesion is not carried out.

(2) A nonwoven fabric given in (1) term whose eyes are 5 - 60 g/m2.

(3) a nonwoven fabric -- fiber -- a flow direction -- receiving -- a right angle -- a direction -- a tenacity elongation curve -- setting -- max -- reinforcement -- 40 -- % - 60 -- % -- corresponding -- stress -- a part -- a wave -- fluctuation -- being shown -- (-- one --) -- a term -- or -- (-- two --) -- a term -- a publication -- a nonwoven fabric .

(4) A nonwoven fabric given in either of the (1) - (3) terms whose stress rate of change of wave fluctuation is 2.0% or more.

(5) A nonwoven fabric given in either of the (1) - (4) terms whose drape multipliers are 0.5 or less.

(6) A nonwoven fabric given in either of the (1) - (5) terms characterized by for the rate of area to the area of the whole nonwoven fabric of the area of a thermal bond field (I) being 25 - 80%, and whenever [breaking extension / of this nonwoven fabric] being 100% or more.

(7) A nonwoven fabric given in either of the (1) - (6) terms whenever [breaking extension / of a nonwoven fabric / whose] are 100 - 200%.

(8) the case where set S (kgf / 5cm) and ductility to E(%), and specific volume is set to V (cm3/g) for the maximum reinforcement of a nonwoven fabric -- a nonwoven fabric given in SE2V >=2.70x105 or (1) - (7) term which comes out and exists.

(9) A nonwoven fabric given in either of the (1) - (8) terms whose high-melting components of a thermal melting arrival nature bicomponent fiber are polypropylene or polyethylene terephthalate.

(10) A nonwoven fabric given in either of the (1) - (9) terms which a nonwoven fabric becomes from cotton-mixing with a thermal melting arrival nature bicomponent fiber and other fiber. (11) Compound-ized nonwoven fabric which carried out the laminating of at least one sort chosen as either of the (1) - (10) terms from the nonwoven fabric of a publication, other nonwoven fabrics, a film, a pulp sheet, knitting, and textiles.

(12) Elasticity compound sheet which carried out the laminating of the elasticity member sheet which was chosen as either of the (1) - (10) terms from the nonwoven fabric of a publication, and the group of a natural rubber elastomer or thermoplastic elastomer, and whose number is at least one.

(13) Absorptivity goods which used a nonwoven fabric, a compound-ized nonwoven fabric, or an elasticity compound sheet given in either of the (1) - (12) terms for the part.

[0010]

[Embodiment of the Invention] The nonwoven fabric of this invention consists of a thermal bond field (I) and a non-thermal bond field (II), a thermal bond field (I) has many parts by which fiber concentrated partially and heat adhesion was carried out, and heat adhesion of the fiber intersection is carried out, without the fiber of a thermal bond field (I) carrying out sticking-by-pressure flattening. Having many parts by which the fiber of this thermal bond field (I) concentrated partially, and heat adhesion was carried out says the condition that junction adhesion of many intersections, contact parts, etc. of fiber is irregularly carried out by melting of the low-melt point point component of that configuration fiber, in the thermal bond field (I)

formed in the part of fiber Webb's arbitration through hot blast.
[0011] Moreover, that heat adhesion of the fiber intersection is carried out without the fiber of a thermal bond field (I) carrying out sticking-by-pressure flattening The configuration fiber of a thermal bond field (I) is heated and pressurized by contact with a heat embossing roll which is in the aforementioned conventional technique. The configuration is flattened and a low-melt point point component and a high-melting component say melting or not a condition in which is softened and fiber carries out sticking-by-pressure adhesion but the condition that junction adhesion of many fiber intersections etc. is carried out by melting of the low-melt point point component, or softening, holding fiber Webb's gestalt mostly. Non-thermal bond fields (II) are parts other than a thermal bond field (I), and the field where heat adhesion of the configuration fiber is not carried out is said.
[0012] When it sees in bird's-eye view, the thermal bond field (I) currently formed in the nonwoven fabric of this invention is distributed regularly, and has the fixed pattern in many cases. The same thing can be said also about the thickness direction of a nonwoven fabric. In a thermal bond field (I), heat adhesion of the fiber intersection of thermal melting arrival nature bicomponent fibers is carried out, and heat adhesion of the fiber intersection of the non-thermal melting arrival nature fiber which mixed with cotton is not carried out with a natural thing.
[0013] However, although the fiber intersection of a thermal melting arrival nature bicomponent fiber and non-thermal melting arrival nature fiber will be said what has become, heat adhesion may be carried out by the class of fiber used in that case, and it may not be so. However, in a thermal bond field (I), since it is necessary to maintain the reinforcement as a nonwoven fabric, most fiber intersections need to restrict the amount of cotton-mixing of the non-thermal melting arrival nature fiber which heat adhesion needs to be carried out, therefore mixes with cotton. In consideration of such a point, the amount of cotton-mixing of non-thermal melting arrival nature fiber of making thermal melting arrival nature fiber into a subject is less than 30 % of the weight preferably.
[0014] Moreover, although parts other than a thermal bond field (I) serve as a non-thermal bond field (II), when the field where some thermal bond field (I) and non-thermal bond field (II) were intermingled is formed around a thermal bond field (I) of the processing approach or processing conditions, the thermal bond field (I) and non-thermal bond field (II) of small area may meet and exist according to them. It is because such fine consideration may also be needed depending on an application.
[0015] The configuration of a thermal bond field (I) is preferably circular, although it is dependent on the approach hot blast passes fiber Webb who consists of a thermal melting arrival nature bicomponent fiber and a rectangle, a ** type, etc. are good. Still more preferably, although it is elliptical [which has a major axis in the direction of a right angle to a fiber flow direction] as nonwoven fabric strength improves, it is not limited to this. Although the aforementioned rate of area and the aforementioned processing method must be taken into consideration, the magnitude of a thermal bond field (I) has desirable 1 - 4mmphi extent, when circular. Moreover, although the arrangement has a desirable alternate pattern, it is not limited to this. Although the eyes of the nonwoven fabric of this invention are based also on the diameter of fiber of configuration fiber, 5 - 60 g/m2 is desirable, and is 15 - 50 g/m2 more preferably, and they are 15 - 30 g/m2 still more preferably. If eyes are made into two or more 5 g/m, handling becomes very easy, and the reinforcement of a nonwoven fabric will also improve and it will become the nonwoven fabric which was rich in practicality. In the case of two or less 60 g/m eyes, since the consistency of the configuration fiber of a nonwoven fabric falls, also in the part of a non-thermal bond field (II), the degree of freedom of fiber increases, processing proper ****** is carried out and flexibility increases. Moreover, in order to use for absorptivity goods, it is effective also in respect of the formation of low cost lightweight.
[0016] This invention is further explained to a detail using a drawing. Drawing 1 is a whole top view which consists of a thermal bond field (I) which has many parts by which heat adhesion was carried out intensively, and a non-thermal bond field (II) and in which showing one example of the nonwoven fabric of this invention, without a thermal melting arrival nature bicomponent fiber carrying out sticking-by-pressure flattening. The thermal bond field (I) is regularly formed

circularly by the alternate pattern.
[0017] Drawing 2 is a sectional view in the X1-X1' side of drawing 1 , and a deep half-tone-dot-meshing part is a thermal bond field (I). Drawing 3 is what formed the thermal bond field (I) in the ellipse form, and drawing 4 is formed in a rectangle.
[0018] Moreover, drawing 5 is an enlarged drawing near the thermal bond field (I) of drawing 1 , and in order to use hot blast on the occasion of thermal bond field formation, the part 3 intermingled in a thermal bond field (I) and a non-thermal bond field (II) exists in the boundary of a thermal bond field (I) and a non-thermal bond field (II). Drawing 6 is a cross-section enlarged drawing near the thermal bond field (I) of drawing 2 , and a thermal bond field (I), a non-thermal bond field (II), and the intermingled part 3 exist like drawing 5 . Moreover, since hot blast passes through a thermal bond field (I) intensively, the fall of some specific volume may be seen compared with a non-thermal bond field (II). Drawing 7 is the whole top view showing one example of the absorptivity goods which used the nonwoven fabric of this invention, and drawing 8 is a sectional view in the X2-X2' side of drawing 7 . Drawing 9 is drawing showing one example of the absorptivity goods which used the nonwoven fabric of this invention, and (a) is the whole top view and it is covered by facing 9. (b) consists of the absorption layers 10 and backseats 11 which were wrapped with facing 9 and tissue paper 12 with the sectional view of X3-X3' of (a).
[0019] Although the nonwoven fabric of this invention forms the thermal bond field (I) which has many through and parts by which heat adhesion was carried out intensively for the hot blast of a low wind speed into the part of the arbitration of fiber Webb who consists of a thermal melting arrival nature bicomponent fiber, as the approach of the formation, the usual hot blast processing machine (suction band dryer) can be used for it in simple. Generally, spraying the hot blast of fixed temperature on a self-propelled conveyor network, a hot blast processing machine is attracted from under a conveyor network, and is suitable for processing a thermal melting arrival nature bicomponent fiber into a bulky nonwoven fabric. In the case of the comparatively little sample of the nonwoven fabric of this invention, it is obtained by putting in the spacer for not crushing fiber Webb's ** as much as possible, inserting by the porous member (for example, punching board) which opened the hole of arbitration, and processing by the hot blast of a low wind speed. Although the quality of the material of this porous member will not be limited especially if it has thermal resistance at the time of hot blast processing, it is common to use the member which opened the hole for the metal plate of versatility, such as iron, stainless steel, and aluminum. in addition, the approach of making the conveyor of a hot blast processing machine a porous type, picking up fiber Webb on it, and processing by hot blast -- or although there is the approach of processing by hot blast on both sides of fiber Webb by the conveyor upper and lower sides of a porous type etc., it is not limited to these.
[0020] When processing it with a hot blast processing machine, as for hot blast, it is desirable softening or that it is a low wind speed in the resin of the sheath component of the thermal melting arrival nature bicomponent fiber which constitutes fiber Webb so that it may have the need and sufficient heating value for carrying out melting and fiber Webb's loft may not be spoiled. Although the wind speed of hot blast is set up in consideration of fiber Webb's eyes, the rate of area of the hole which was able to be opened in the porous member, and the rate of hot blast processing and the heating value of hot blast, its 0.5 m/sec - 20 m/sec extent is desirable. That is, in order to obtain the nonwoven fabric of this invention, an approach and processing conditions which reduce ** sharply do not have the desirable part by which heat adhesion was carried out intensively. Moreover, the configuration of a thermal bond field (I), magnitude, and arrangement can be easily changed by the porous member. the case where a punching board is used although it depended for the configuration of a thermal bond field on the approach hot blast passes fiber Webb -- the hole -- it is mostly determined in a configuration. Circularly [it is desirable and] and still more preferably, although it is elliptical [which has a major axis in the direction of a right angle to a fiber flow direction] as nonwoven fabric strength improves, it is not limited to this.
[0021] Thus, in the nonwoven fabric of this invention, a thermal bond field (I) and a non-thermal bond field (II) are formed, and since configuration fiber has not carried out sticking-by-pressure flattening even if the degree of freedom of a motion of fiber is high and is a thermal bond field (I),

since heat adhesion of the configuration fiber is not carried out, the non-thermal bond field (II) has the degree of freedom of a certain amount of motion. Therefore, the flexibility excellent in the nonwoven fabric whole region is discovered. Moreover, when the outstanding extensibility can also make it discovered and it sticks with an elasticity member sheet, 100% or more of nonwoven fabric ductility needed for following in footsteps of the expanding becomes possible.

[0022] In order to use the nonwoven fabric of this invention as a high ductility nonwoven fabric, 25 - 80% is desirable still more desirable, and the whole area of a thermal bond field (I) rate of area (100x (I) /((I)+(II))) is 30 - 50%. When this rate of area is 25% or more, a thermal bond field (I) increases and nonwoven fabric reinforcement becomes high, and ductility also improves and it becomes the nonwoven fabric which was rich in practicality. Moreover, when this rate of area is 80% or less, since the non-thermal bond field (II) of a nonwoven fabric increases, the increase of the degree of freedom of the configuration fiber of a nonwoven fabric and ductility become high, and it becomes the thing excellent in flexibility, and is desirable. The rate of area as well as modification of the configuration of a thermal bond field (I), magnitude, and arrangement can be easily changed by the porous member.

[0023] Acrylic fibers, such as polyamide fibers, such as polyolefin fibers, such as polyester fiber, such as polyethylene terephthalate, polyethylene, and polypropylene, nylon 6, and Nylon 66, and a polyacrylonitrile, can be used for the thermal melting arrival nature bicomponent fiber which constitutes the nonwoven fabric of this invention. It is desirable for thermal melting arrival nature bicomponent fibers, such as a sheath-core type of the polyolefine system which consists of thermal melting arrival nature bicomponent fibers, such as a sheath-core type of the polyester system which consists of polyethylene/polyethylene terephthalate, and an eccentric mold, and polyethylene/polypropylene, and an eccentric mold, etc. to be what these became a subject and was interwoven, and to be constituted especially, for example. When it is going to obtain the high ductility nonwoven fabric which had high extensibility especially, the rigidity of fiber is comparatively high and it is desirable to use thermal melting arrival nature bicomponent fibers, such as a sheath-core type of the polyester system which consists of polyethylene/polyethylene terephthalate out of which a nonwoven fabric becomes bulky and a moderate feeling of an elongation stop tends to come at the time of expanding, and an eccentric mold. Moreover, although it is comparatively flexible as fiber, and light preferably and it good to form fiber Webb by the card method using the staple fiber with which heat treatment made the subject the easy sheath-core type thermal melting arrival nature bicomponent fiber of said polyolefine system when aiming at giving high flexibility to a nonwoven fabric, it is not limited to this.

[0024] Although the thermal melting arrival nature bicomponent fiber which constitutes the nonwoven fabric of this invention consists of a low-melt point point component and a high-melting component, the melting point difference of the resin of a low-melt point point component and the resin of a high-melting component has a desirable combination which has 10 degrees C or more also from the point of the thermal melting arrival nature effectiveness. When a staple fiber is used for the nonwoven fabric of this invention, fiber Webb is formed by the card method, the air RAID method, etc., and when continuous glass fiber is used, fiber Webb is formed by the span bond method etc. Moreover, fiber, a hollow fiber, etc. of a single component may be made to interweave for the purpose of improvement in a loft etc. at the time of these fiber Webb formation. With interweaving as used in the field of this invention, interweaving of continuous glass fibers and cotton-mixing of staple fibers are included.

[0025] When the nonwoven fabric strong ductility of a right-angled direction (it is written as the direction of CD below) is measured to the fiber flow direction (it is written as the direction of MD below) of the nonwoven fabric of this invention, like other nonwoven fabrics near the maximum reinforcement Although big fluctuation of the stress by a lot of exfoliation for heat jointing, destruction, etc. breaks out and it appears also in a tenacity elongation curve (it is written as a S-S curve below) clearly, by the time it results near the maximum reinforcement, especially in the case of the nonwoven fabric of this invention, wave-like fluctuation will occur in expanding stress. This phenomenon is remarkable in the stress part which corresponds to 40% - 60% to the maximum reinforcement, and can read wave fluctuation in the S-S curve of a nonwoven fabric.

This is a phenomenon which happens since it has the thermal bond field (I) and non-thermal bond field (II) which have many parts by which heat adhesion was carried out intensively. That is, although a non-thermal bond field (II) is lengthened and reinforcement is held together with a thermal bond field (I) at the time in early stages of measurement of nonwoven fabric strong ductility In the stress part which corresponds to 40% - 60% to the maximum reinforcement It is the form pulled by the non-thermal bond field (II), and is because the fiber intersection when heat adhesion of the thermal bond field (I) currently formed regularly was carried out raises the numeric value of nonwoven fabric reinforcement for exfoliation etc. with the lifting gradually and wave-like fluctuation is brought to stress.

[0026] Thus, in the S-S curve of the direction of CD of the nonwoven fabric of this invention, although wave-like stress fluctuation is seen in the stress part equivalent to 40% - 60% of the maximum reinforcement, as for the stress rate of change, it is desirable to become 2.0% or more. This is because the thermal bond field (I) and non-thermal bond field (II) which have many parts by which heat adhesion was carried out intensively are formed in a nonwoven fabric and sufficient flexibility is acquired, when it becomes 2.0% or more of stress rate of change. On the contrary, a non-thermal bond field (II) decreases that it is the rate of change which is much less than 2.0%, it becomes a hard nonwoven fabric, and flexibility is lost.

[0027] As an approach of measuring the flexibility of a nonwoven fabric, a drape multiplier is typical. This approach is JIS. It is set as G law of L1096. By a drape multiplier's measuring the drape property of a nonwoven fabric, and opening and carrying a nonwoven fabric on a cylinder-like base, and measuring projected area, the numeric value becomes small, so that drape property is high. As mentioned above, since configuration fiber has not carried out sticking-by-pressure flattening even if the thermal bond field (I) and the non-thermal bond field (II) are formed, and a non-thermal bond field (II) has the high degree of freedom of fiber and is a thermal bond field (I), since heat adhesion of the configuration fiber is not carried out, it has a certain amount of degree of freedom in the nonwoven fabric of this invention. Therefore, the flexibility excellent in the nonwoven fabric whole region can be discovered, and it can carry out to below "0.5" that is the numeric value which shows high flexibility. Specific volume is computed as a numeric value showing the loft of a nonwoven fabric. If this numeric value is high, it can be said that that nonwoven fabric is that of a bulky potato by the low consistency.

[0028] Since the nonwoven fabric of this invention makes the subject the thermal melting arrival nature bicomponent fiber, it can perform easily other materials, junction or adhesion, and compound-ization called combination in heat adhesion etc. According to the purpose of use gestalten including absorptivity goods, a laminating is carried out to at least one sort chosen from other nonwoven fabrics, a film, a pulp sheet, knitting, textiles, etc., and it can become a various functions compound-ized nonwoven fabric.

[0029] Moreover, by arranging effectively the nonwoven fabric or compound-ized nonwoven fabric of such this invention on absorptivity goods, by the Prior art, the flexibility excellent in bulky [which was not obtained] is given and it enables a hand to offer good absorptivity goods. In the case of a disposable disposable diaper, the pulp aggregate wrapped in tissue paper is made as an absorption layer by making the nonwoven fabric of this invention into facing, by making a polyethylene film into a backseat, a laminating is carried out and what was unified by heat adhesion etc. can be illustrated. As facing which is the part which touches the wearing person of a disposable disposable diaper directly, in this case, the nonwoven fabric of this invention There are hand cushioning properties, and get twisted at the time of wearing, and ****** is received. the flexibility excellent in bulky -- high -- An irregular chip box crest (TSUNO) is not generated, only facing does not float, and displeasure is not given to a wearing person as always unified absorptivity goods, and the engine performance as absorptivity goods can be demonstrated.

[0030] The nonwoven fabric of this invention and the elasticity sheet stuck are at least one sort chosen from the group of a natural rubber elastomer and thermoplastic elastomer, and has the nonwoven fabric and film which specifically consist of a polyester system elastomer which are natural rubber, various synthetic rubber, for example, a polyethylene terephthalate block-polytetramethylene glycol, and a polybutylene RETEFUTA Leto block-polytetramethylene glycol. Moreover, there are the nonwoven fabric and film which consist of a polyurethane system

elastomer which consists of polyether-ester polyol, and a polyolefine system elastomer which is the ethylene propylene rubber which blended ethylene vinyl acetate. When an elasticity sheet is a nonwoven fabric, generally, there may be many nonwoven fabrics by the melt blowing method, in addition nonwoven fabrics, such as the span bond method and a flash plate spinning method, are sufficient as them, and they are not limited especially. What is necessary is just to choose in consideration of required strength, a degree of shrinkage, heat-resistant lightfastness, chemical resistance, etc.

[0031] The lamination of the nonwoven fabric and elasticity sheet for forming an elasticity compound sheet is in the condition of not expanding an elasticity sheet, and the adhesives of a synthetic-resin system can perform it. For example, especially limitation is not carried out although there are adhesives which use a polyolefine system, an ethylene vinyl acetate system, acrylic, etc. as a principal component. Although it is desirable and it is desirable to apply according to a thermal bond field (I) by 1mm or less as for a point (magnitude of spreading) also in order for performing spreading of adhesives by punctiform to employ expanding of a high ductility nonwoven fabric efficiently, it is not limited to this. Since the nonwoven fabric of this invention to stick has the high expanding imitation nature to an elasticity sheet, in case it is stuck like before, it can be stuck not in the condition which elongated the elasticity sheet but in the condition before expanding. Therefore, it pleats, and since [my] it cannot do, appearance is also good, and is depended on contact to a wearing person, or fear, such as blurring, also decreases.

[0032] In the case of the disposable diaper of throwing away for trousers type children, it sticks with the nonwoven fabric of this invention, and the elasticity member sheet which was chosen from the group of a natural rubber elastomer and thermoplastic elastomer and whose number is at least one, and what has been arranged at the flexible member of waist can be illustrated. in this case, the extensibility the nonwoven fabric of this invention excelled [extensibility] in bulky as a member which is the part which touches the wearing person of a disposable disposable diaper directly -- adding -- high -- since there are hand cushioning properties, to the elongation of the disposable diaper at the time of wearing, it fully elongates and insurance can be equipped easily. Appearance also becomes good and the child who began to be conscious of self can also be considered as a thing near the usual trousers.

[0033] this invention persons found out that there should just be 100% of expanding, as a result of analyzing many disposable diapers for children commercial trousers type and investigating the extensibility of the elasticity member of the waist. Moreover, even if extensibility was extended too much, it was unsuitable, and in the condition that expanding exceeds 200%, also when there was insecurity over elongation, it also found out a certain thing. The nonwoven fabric of this invention had 100% or more of extensibility, and had a natural feeling of an elongation stop, in addition productivity was also good and it was a safe material, and with bulky, since aesthetic property was also good, it has checked that practicality was very high.

[0034] Furthermore, the range where the above-mentioned variable fills the following relational expression as a nonwoven fabric which is satisfied with coincidence of the ductility (E %), reinforcement (Skgf / 5cm), and dimension height (specific volume, Vcm3/g) of this invention is desirable (refer to Table 2). Since ductility was especially important, the nonwoven fabric which the semantics of this formula requires for this invention carried out the square only of this, while maintaining ductility, reinforcement, and dimension height on level high to coincidence.

SE2V >=2.70x105[0035] The nonwoven fabric of this invention can be illustrated also as a flexible member of the waist of not only the object for children but the disposable diaper for adults. In addition, the compound-ized nonwoven fabric which stuck SM nonwoven fabric which made the span bond nonwoven fabric, and a span bond nonwoven fabric (S) and a melt blow nonwoven fabric (M) unify or the SMS nonwoven fabric made to unify with the structure of a span bond nonwoven fabric / melt blow nonwoven fabric / span bond nonwoven fabric, and the nonwoven fabric of this invention as side gathers of horizontal leakage prevention of the usual absorptivity goods can be illustrated. In this case, with a span bond nonwoven fabric, SM nonwoven fabric, or an SMS nonwoven fabric, nonwoven fabric reinforcement and barrier property are compensated and the feeling of adhesion to which the nonwoven fabric of this

invention was rich in the circumference of the crotch of the wearing person of absorptivity goods at flexibility and cushioning properties can be offered.

[0036] It is desirable to have prompt liquid permeability, when the nonwoven fabric of this invention is arranged as facing of absorptivity goods, such as a disposable disposable diaper and a disposable sanitary napkin, and an absorption sheet, and when the liquid permeability is insufficient, it is desirable to give chemical fiber surface treatment by a surfactant etc., and to give liquid permeability. It is desirable to have the water repellence or hydrophobicity with an expensive nonwoven fabric of this invention, when the nonwoven fabric of this invention is arranged at the member which needs the water repellence or hydrophobicity of waist, such as a flexible member and side gathers, and when the water repellence or hydrophobicity is insufficient, it is desirable to give chemical fiber surface treatment by a surfactant etc., and to give water repellence or hydrophobicity.

[0037]

[Example] Although an example explains this invention to a detail, this invention is not limited to these examples. The evaluation approach and an evaluation procedure are shown below.

[0038] (1) nonwoven fabric strong ductility and the stress rate of change JIS — measure the strong ductility of a nonwoven fabric based on the tensile test specified by L1906 of law. A measurement sample uses what was cut into 150mmx50mm by making a direction (the direction of CD) perpendicular to the direction of a fiber list of a nonwoven fabric into a longitudinal direction.

(Procedure) Using "autograph AG500D" by Shimadzu, on condition that the following, nonwoven fabric strong ductility is measured and a S-S curve chart is obtained.

Chart output of a speed-of-testing 100 mm/min grip width-of-face 100 mmS-S curve X-axis (the ductility direction) : 0.5%/mm Y-axis (the direction on the strength): Check the existence of an epilogue and wave fluctuation for the point on the S-S curve equivalent to 40% of the maximum reinforcement, and the point which hits to 60% in a straight line from 4 g/mmS-S curve. When there is wave fluctuation, the maximum variation (deltak) of the stress from the stress value on the straight line (k) is read, and the stress rate of change (f) which is a rate to stress is computed according to the following formula (unit: %).

F=delta k/kx100[0039] (2) The following supply was used in measurement of drape ******.

** Drape base : the Plastic solid of the shape of a cylinder for which the heart component used [the sheath component with the diameter of 64mm, a height / of 100mm /, and a weight of 76g] the thermal melting arrival nature bicomponent fiber of polypropylene with polyethylene.

** Dead weight : the diameter of 64mm, the product made from weight [of 2g] ** CCD camera:Ikegami "FCD-10"

A measurement sample uses the thing with a diameter of 20.8mm cut circularly.

[0040] (Measurement procedure) JIS L1096 It is based on G law (drape multiplier). A measurement sample is carried on a drape base (each other core is doubled at this time). After making the whole go up and down 3 times as [this condition / of placing a dead weight on a measurement sample (the core of a dead weight being similarly doubled with the core of a measurement sample and a drape base.)], it is left for 1 minute. Then, the projected area from right above is measured using a CCD camera. About one sample, a table and a flesh side are measured, the average is calculated, and a drape coefficient D is computed according to the following formula. At this time, area of S1 and a measurement sample is set [the projected area from right above] to S2 for the area of Ad and a drape base. A drape coefficient D is hard if 1.0 is approached, and it can be said that drape property is high, so that 0 is approached.

D=(Ad-S1)/(S2-S1)

[0041] (3) Observe the front face of the rate nonwoven fabric of area, measure the area of the thermal bond field (I) where configuration fiber concentrates partially and heat adhesion is carried out, and compute the rate of area to a whole measurement sample surface product. A measurement sample uses what was cut into 100mmx100mm.

(Measurement procedure) OMRON "3D Digital Fine Scope VC2400-IMU Ver.2.3" is used, the front flesh side of a measurement sample is observed, and the area of a thermal bond field (I) is measured. The average of a front flesh side is computed (%).

[0042] (4) Compute the specific volume specific volume v according to the following formula (unit: cm3/g). The eyes of a nonwoven fabric are set to w (g/m2), the "DEJISHIKKUNESUTE star" made from an Oriental energy machine is used, and thickness of the nonwoven fabric measured on condition that load 2 g/cm2 and reading-per-second 2 mm/sec is set to t (mm). v=t/wx1000[0043] It was the polyethylene whose component of example 1 sheath is the melting point of 130 degrees C, and the thermal melting arrival nature bicomponent fiber which is polypropylene whose component of the heart is the melting point of 162 degrees C, and the fineness considered the 51mm thing as 2 deniers / filament, cut length considered as configuration fiber, and it considered as fiber Webb by the card method. With the condition that put this fiber Webb on the conveyor network, surrounded with the spacer with a height of 1.0mm, and the circular hole with a diameter of 3mm covered on the punching board which was able to be opened in staggered arrangement at intervals of 2mm, KOTOBUKI The "DB-182 type" hot blast processing machine made from Co. and Ltd. is used. The nonwoven fabric which has a thermal bond field (I) as shows hot blast to drawing 1 of through and eyes 25 g/m2 on condition that the working temperature of 140 degrees C, floor-to-floor-time 12sec, and wind-speed 1.2 m/sec, and a non-thermal bond field (II) was obtained.

[0044] It is the polyethylene whose component of example 2 sheath is the melting point of 130 degrees C, and the thermal melting arrival nature bicomponent fiber which is polyethylene terephthalate whose component of the heart is the melting point of 253 degrees C, and the nonwoven fabric which has a thermal bond field (I) as shown in drawing 1 , and a non-thermal bond field (II) like the aforementioned example 1 was obtained except the fineness having considered the 51mm thing as 2 deniers / filament, and cut length having considered as configuration fiber, and having made working temperature into 138 degrees C.

[0045] It is the thermal melting arrival nature bicomponent fiber which are the copolymer polypropylene whose component of example 3 sheath is the melting point of 138 degrees C, and polypropylene whose component of the heart is the melting point of 162 degrees C, and the nonwoven fabric which has a thermal bond field (I) as shown in drawing 1 , and a non-thermal bond field (II) like the aforementioned example 1 was obtained except the fineness having considered the 38mm thing as 1.8 deniers / filament, and cut length having considered as configuration fiber, and having made working temperature into 145 degrees C

[0046] The nonwoven fabric which has a thermal bond field (I) as shown in drawing 3 , and a non-thermal bond field (II) was obtained like the aforementioned example 1 except having become what the hole of the ellipse form of the major axis of 4.0mm and 2.0mm of minor axes turned the major axis in the direction of CD for the wrap punching board, and was able to open in the major-axis direction at 1.5mm, and it was able to open in the direction of a minor axis at intervals of 2mm at staggered arrangement about example 4 fiber Webb.

[0047] The nonwoven fabric which has a thermal bond field (I) as shown in drawing 3 , and a non-thermal bond field (II) like an example 2 was obtained except having used the punching board used in the example 4 of the example 5 above.

[0048] The nonwoven fabric which has a thermal bond field (I) as shown in drawing 1 of eyes 50 g/m2, and a non-thermal bond field (II) like the example 1 of the example 6 above was obtained.

[0049] Compound spinning was carried out by the span bond method combining polyethylene with example 7 melting point of 129 degrees C and polypropylene with a melting point of 164 degrees C, and thermal melting arrival nature compound continuous glass fiber Webb of a sheath-core type was obtained. The fineness was 1.0 deniers / filament. The continuous glass fiber nonwoven fabric which has a thermal bond field (I) as shows obtained continuous glass fiber Webb to drawing 1 of eyes 5 g/m2 like the aforementioned example 1, and a non-thermal bond field (II) was obtained.

[0050] They are the polyethylene whose component of example 8 sheath is the melting point of 130 degrees C, and the thermal melting arrival nature bicomponent fiber which is polypropylene whose component of the heart is the melting point of 162 degrees C. 2 deniers / filament, and cut length the fineness to a 51mm thing the polypropylene fiber whose melting point is 162 degrees C -- the fineness -- 2 deniers / filament, and cut length -- 40mm -- 15wt(s)% -- it mixing with cotton and except having made this into configuration fiber The nonwoven fabric

which has a thermal bond field (I) as shown in drawing 1 R> 1, and a non-thermal bond field (II) like the aforementioned example 1 was obtained.
[0051] The nonwoven fabric which has a thermal bond field (I) as shown in drawing 1 of eyes 70 g/m2, and a non-thermal bond field (II) like the example 1 of the example 9 above was obtained.
[0052] The nonwoven fabric of examples 1-9 was cut according to the measuring method, and the measurement sample was created. Using these measurement samples, nonwoven fabric strong ductility measurement of the direction of CD was performed, and the existence of the wave fluctuation in the part which corresponds to 60% from 40% of the maximum reinforcement of a S-S curve was checked from the measurement result. When wave fluctuation was seen, stress rate of change was measured. Moreover, a drape multiplier and specific volume were measured. The result is shown in Table 1.
[0053] The nonwoven fabric in which the whole carried out the thermal bond mostly was obtained like the aforementioned example 1 except having let hot blast pass to whole fiber Webb on condition that the working temperature of 133 degrees C, floor-to-floor-time 12sec, and wind-speed 0.8 m/sec without using an example of comparison 1 punching board, and a spacer.
[0054] The nonwoven fabric in which the whole carried out the thermal bond mostly was obtained like the aforementioned example 2 except having let hot blast pass to whole fiber Webb on condition that the working temperature of 129 degrees C, floor-to-floor-time 12sec, and wind-speed 0.8 m/sec without using an example of comparison 2 punching board, and a spacer.
[0055] The nonwoven fabric in which the whole carried out the thermal bond mostly was obtained like the aforementioned example 3 except having let hot blast pass to whole fiber Webb on condition that the working temperature of 142 degrees C, floor-to-floor-time 12sec, and wind-speed 1.2 m/min without using an example of comparison 3 punching board, and a spacer.
[0056] Fiber Webb of eyes 25 g/m2 was obtained by the card method using the same configuration fiber as example of comparison 4 example 1. It heat-treated to the fiber web, having put this fiber Webb on the conveyor network, having covered on the same punching board as an example 1 without using a spacer, having made 130-degree C hot blast blow off for 1 second by wind-speed 200 m/min for every hole of a punching board using the nozzle of 0.7mm of apertures, and drawing in on the background of a conveyor network. However, a part of Webb for a pore of a punching board dispersed, and it changed into the condition that the hole opened. Moreover, the amount of [which remained] jointing was also unsuitable for it being crushed by the wind pressure, being stuck to it by pressure, and considering as a measurement sample.
[0057] The nonwoven fabric of the examples 1-3 of a comparison was cut according to the measuring method, and the measurement sample was created. Using these measurement samples, nonwoven fabric strong ductility measurement of the direction of CD was performed, and when the existence of the wave fluctuation in the part equivalent to 40% - 60% of the maximum reinforcement of a S-S curve was checked and wave fluctuation was seen from the measurement result, stress rate of change was measured. Moreover, a drape multiplier and specific volume were measured. The result is shown in Table 1.
[0058]
[Table 1]

	目付 (g/m²)	不織布強伸度 最大強度 (kg/5cm)	伸度 (%)	波形変動の有無	波形変動率 (%)	ドレープ係数	比容積 (cm³/g)
実施例1	25	0.704	130	有り	5.0	0.39	47
実施例2	25	0.652	148	有り	3.4	0.38	75
実施例3	25	0.615	101	有り	2.8	0.37	45
実施例4	25	0.784	110	有り	4.2	0.43	40
実施例5	25	0.698	122	有り	3.0	0.41	73
実施例6	50	0.881	120	有り	2.5	0.49	36
実施例7	5	0.398	101	有り	2.0	0.29	10
実施例8	25	0.609	138	有り	3.6	0.32	42
実施例9	70	0.912	89	有り	1.6	0.69	26
比較例1	25	0.614	40	無し	---	0.89	52
比較例2	25	0.562	68	無し	---	0.87	80
比較例3	25	0.645	37	無し	---	0.91	50

[0059] The evaluation result shown in Table 1 is considered. When an example 1 is compared with the example 1 of a comparison, while the numeric value of nonwoven fabric reinforcement or specific volume is almost equal and has an equivalent loft with the nonwoven fabric which used the same thermal melting arrival nature bicomponent fiber, an example 1 has the low numeric value of a drape multiplier, and is understood that it excels in flexibility.

[0060] The same is said of the comparison of an example 2, the example 2 of a comparison and an example 3, and the example 3 of a comparison, and it turns out that the flexibility of the nonwoven fabric of examples 2 and 3 is excellent. Moreover, the examples 1-3 of a comparison are set in the S-S curve, wave fluctuation also accepts a gap and the result of Table 1 essentially shows that **** and the heterogeneous physical properties in which a thermal bond field (I) and a non-thermal bond field (II) do not exist like the nonwoven fabric of this invention are shown.

[0061] Although the configuration of a thermal bond field (I) of having many parts by which concentrated partially and heat adhesion was carried out in the example 4 and the example 5 was extended in the direction of CD and nonwoven fabric reinforcement was raised, it turns out that the flexibility is maintained and the nonwoven fabric corresponding to various needs can be offered by changing a configuration, processing conditions, etc. variously.

[0062] The example 6 and the example 7 show that the eyes of a nonwoven fabric have high effectiveness in the range of 5 - 60 g/m2. Although it is the nonwoven fabric which used the same thermal melting arrival nature bicomponent fiber as an example 9, by having made eyes or less [60g //m] into two, specific volume becomes remarkably high, a drape multiplier also becomes small and, as for an example 1 and an example 6, its flexibility improves. Therefore, it can be said that the eyes of two or less [60g //m] are very desirable.

[0063] Although it is the nonwoven fabric which mixed with cotton the staple fiber of a single component, as for the case of an example 8, it turns out that flexibility is improving further. It turns out that other fiber, **********, etc. of a single component are interwoven, it considers as a still various functions nonwoven fabric by making a thermal melting arrival nature bicomponent fiber into a subject by this, and this can be offered.

[0064] The nonwoven fabric of examples 1-8 excels these especially in flexibility, and it turns out that versatility and application are high.

[0065] To the same fiber Webb of configuration fiber as example 10 example 8, the laminating of continuous glass fiber Webb of the same configuration fiber as an example 7 was carried out, and the compound-ized nonwoven fabric which has a thermal bond field (I) as shown at drawing 1 , and a non-thermal bond field (II) was obtained like the aforementioned example 1. Employing efficiently the dimension height which fiber Webb formed by the card method has, this compound-ized nonwoven fabric had the high nonwoven fabric strength of the continuous glass fiber nonwoven fabric by the span bond method, and had the outstanding flexibility.

[0066] The thermal melting arrival nature bicomponent fiber which is the fineness of 2 deniers /

filament, and 5mm of cut length who is the polyethylene whose component of example 11 sheath is the melting point of 130 degrees C, and polypropylene whose component of the heart is the melting point of 162 degrees C 30 % of the weight, On the air RAID nonwoven fabric (80g/m2) with which pulp was formed considering 70 % of the weight as configuration fiber, the laminating of fiber Webb of the same configuration fiber as the aforementioned example 1 was carried out, and the compound nonwoven fabric was obtained like the example 1. Although this compound nonwoven fabric was thick, an irregular chip box crest (TSUNO) is not generated to bending, but it is supple, and was rich in cushioning properties. Moreover, since it had covered with the nonwoven fabric which has a thermal bond field (I) as shows the nonwoven fabric front face of an air RAID nonwoven fabric to drawing 1 equivalent to an example 1, and a non-thermal bond field (II), the point became good.

[0067] Thus, an example 10 and an example 11 show the nonwoven fabric of this invention not spoiling the flexibility as a compound nonwoven fabric, when a laminating can be easily carried out to other nonwoven fabrics etc. by heat treatment, but becoming a more highly efficient compound-ized nonwoven fabric taking advantage of the special feature and the description which the partner of compound-izing has.

[0068] The absorptivity goods a which made facing the nonwoven fabric of example 12 example 1, have arranged the pulp sheet (240g/m2) wrapped in the lower layer with tissue paper as an absorption layer, and have arranged the polyethylene film in the lower layer as shown in drawing 9 and drawing 10 were produced. With the same structure, the absorptivity goods b which have arranged the nonwoven fabric of the example 1 of a comparison to facing were produced. Chip box evaluation (the whole is used as 3 chip boxes and how to break is evaluated) and torsion evaluation (the whole gets twisted and condition is evaluated) of a longitudinal direction were performed about the absorptivity goods a and b. In chip box evaluation, although, as for the absorptivity goods a, a fold was not conspicuous and the remains of a chip box did not remain, either, the absorptivity goods b are in the condition in which the irregular chip box crest (TSUNO) appeared and a part of facing floated, and the remains of a chip box remained for a while. Although Absorber a is in the condition to which facing got used well in the whole and the comparatively small crease occurred in the longitudinal direction in torsion evaluation, facing came floating to torsion and the comparatively big crease generated the absorptivity goods b.

[0069] Thereby, the absorptivity goods a which have arranged the nonwoven fabric of an example 1 to facing are excellent in flexibility, and unify as absorptivity goods, and it gets twisted and it turns out to ****** that it is effective.

[0070] It was the polyethylene whose component of example 13 sheath is the melting point of 130 degrees C, and the thermal melting arrival nature bicomponent fiber which is polyethylene terephthalate whose component of the heart is the melting point of 253 degrees C, and the fineness considered the 51mm thing as 2 deniers / filament, cut length considered as configuration fiber, and it considered as fiber Webb by the card method. This fiber Webb is enclosed with a spacer with a height of 1.0mm, and is covered on a punching board, and it is KOTOBUKI. When the "DB-182 type" hot blast processing machine made from Co. and Ltd. was used and it let hot blast pass on condition that the working temperature of 138 degrees C, floor-to-floor-time 12sec, and wind-speed 1.9 m/sec, the circular thermal bond field (I) with a diameter [as shown in drawing 1] of 3.6mm was formed in 1.4mm spacing by staggered arrangement. The eyes of this nonwoven fabric were 22 g/m2, and the rate of distribution area of a thermal bond field (I) was 40%.

[0071] The aperture of an example 14 punching board was changed and the diameter as shown in drawing 1 obtained the nonwoven fabric like the aforementioned example 13 by 2.8mm except having formed the circular thermal bond field (I) whose spacing is 2.2mm. The rate of area of a thermal bond field (I) was 25%.

[0072] The aperture of an example 15 punching board was changed and the diameter as shown in drawing 1 obtained the nonwoven fabric like the aforementioned example 13 by 4.5mm except having formed the circular thermal bond field (I) whose spacing is 0.5mm. The rate of area of a thermal bond field (I) was 80%.

[0073] The aperture and hole form of an example 16 punching board were changed, in the ellipse

form of the major axis of 4.2mm, and 3.0mm of minor axes as shown in drawing 3 , the major axis was turned in the direction of CD, and the nonwoven fabric was obtained like the aforementioned example 13 except having formed 0.8mm in the major-axis direction, and having formed the thermal bond field (I) in the direction of a minor axis at intervals of 2mm at staggered arrangement. The rate of area of a thermal bond field (I) was 40%.

[0074] The melting point carries out 15w% cotton-mixing of the fineness of 2 deniers / filament which uses as a component the polyethylene terephthalate which is 254 degrees C, and the staple fiber of 51mm of cut length, and makes configuration fiber the same thermal melting arrival nature bicomponent fiber as example 17 example 13 for this, The aperture of a punching board was changed and the diameter as show in drawing 1 obtained the nonwoven fabric like the example 13 by 4.0mm except having form the circular thermal bond field (I) whose spacing is 1.0mm. The rate of area of a thermal bond field (I) was 50%.

[0075] The nonwoven fabric of eyes 22 g/m2 was obtained like the example 13 of the example 18 above. Since the aperture of a punching board was changed, the thermal bond field (I) was a round shape whose spacing a diameter as shown in drawing 1 (a) is 2.3mm in 2.7mm. The rate of area of a thermal bond field (I) was 23%.

[0076] The nonwoven fabric of examples 13-18 was cut according to the measuring method, and the measurement sample was created. Nonwoven fabric strong ductility measurement of the direction of CD and measurement of specific volume were performed using these measurement samples. The result is shown in Table 2.

[0077]

[Table 2]

	目付 (g/m^2)	面積率 (%)	不織布強伸度 最大強度 (5kgf/5cm)	伸度 (%)	比容積 (Vcm^3/g)	SE^2V ($\times 10^5$)
実施例13	22	40	0.700	147	61	9.22
実施例14	22	25	0.404	104	63	2.75
実施例15	22	80	0.908	101	54	5.00
実施例16	22	40	0.811	137	62	9.44
実施例17	22	50	0.591	123	73	6.53
実施例18	22	23	0.362	89	62	1.78
比較例5	22	100	1.169	68	49	2.65
比較例6	30	0	0.800	71	25	1.01

[0078] The nonwoven fabric in which the whole carried out the thermal bond mostly was obtained like the aforementioned example 13 except having let hot blast pass to whole fiber Webb on condition that the working temperature of 133 degrees C, floor-to-floor-time 12sec, and wind-speed 1.5 m/sec without using an example of comparison 5 punching board, and a spacer. The rate of area of a thermal bond field (I) was about 100%.

[0079] The fineness of 2 deniers / filament which uses as a component the polyethylene terephthalate whose example of comparison 6 melting point is 254 degrees C, and the staple fiber of 51mm of cut length were used, water needle processing was performed to what was made into fiber Webb using the card method, and the eyes fiber carried out [eyes] the confounding mutually obtained the nonwoven fabric of 30g/m2. After water needle processing used 0.1mm of diameters of a nozzle, and a nozzle pitch 1.0mm nozzle and carried out conditioning twice with the water pressure of 20kg/cm2 by conveyor rate 20 m/min, confounding processing of it was carried out 4 times with the water pressure of 50kg/cm2.

[0080] The nonwoven fabric of the example 5 of a comparison and the example 6 of a comparison was cut according to the measuring method, and the measurement sample was created. Nonwoven fabric strong ductility measurement and specific volume of the direction of CD were measured using these measurement samples. The result is shown in Table 2.

[0081] The evaluation result shown in Table 2 is considered. When an example 13 is compared with the example 5 of a comparison, it is the nonwoven fabric which used the same thermal melting arrival nature bicomponent fiber, and while the numeric value of nonwoven fabric reinforcement or specific volume is almost equal and has an equivalent loft, an example 13 has large nonwoven fabric ductility, and excelling in extensibility is clear.
[0082] It is shown that an example 14 and an example 15 have large ductility in the range whose rate of distribution area of the thermal bond field (I) of a nonwoven fabric is 25 - 80%. If the rate of distribution area of a thermal bond field (I) becomes 25% or more about these examples in the case of the nonwoven fabric which used the same thermal melting arrival nature bicomponent fiber as an example 13 as compared with the example 18, nonwoven fabric reinforcement will improve remarkably and nonwoven fabric ductility's will improve in connection with it. Therefore, 25% or more and 80% or less of especially thing has the desirable rate of distribution area of a thermal bond field (I).
[0083] Although the example 16 extended the configuration of a thermal bond field (I) of having many parts by which concentrated partially and heat adhesion was carried out, in the direction of CD and raised nonwoven fabric reinforcement, it turns out that the extensibility is maintained and the high ductility nonwoven fabric corresponding to various needs can be offered by changing variously a configuration, processing conditions, etc. of a thermal bond field (I).
[0084] Although it is the nonwoven fabric which mixed with cotton the staple fiber of a single component, as for the case of an example 17, it turns out that the loft is improving further. It turns out that other fiber, **********, etc. of a single component are interwoven, it considers as a still various functions nonwoven fabric by making a thermal melting arrival nature bicomponent fiber into a subject by this, and this can be offered.
[0085] The nonwoven fabric of examples 13-17 excels these especially in flexibility, and it turns out that versatility and application are high.
[0086] The lamination elasticity compound sheet was obtained using the hot melt agent of a polyolefine system in the form which puts the melt blow nonwoven fabric which consists of a polyurethane system elastomer with the nonwoven fabric obtained in the example 19 example 13. This elasticity compound-ized sheet had the flexibility which aesthetic property is good, and the elasticity by the polyurethane system elastomer is supple, and was excellent with the dimension height which fiber Webb formed by the card method has.
[0087] Thus, from an example 19, the nonwoven fabric of this invention does not spoil the elasticity as an elasticity compound sheet, when a laminating can be easily carried out to other nonwoven fabrics etc., but aesthetic property is good bulky, and it turns out that it becomes the high elasticity compound-ized sheet of more highly efficient practicality.
[0088] The pulp sheet (240g/m2) wrapped in example 20 tissue paper was stuck on the polyethylene film, and it considered as the absorption layer, and the elasticity compound sheet obtained in the example 19 has been arranged as flexible material of the circumference of the waist, and the absorptivity goods c as shown in drawing 7 and drawing 8 were produced. About the absorptivity goods c, the organic-functions elasticity trial supposing the time of wearing of the absorptivity goods c was performed. The organic-functions elasticity trial put both hands into the circumference part of the waist of the absorptivity goods c, extended them right and left, and evaluated the flexible condition sensuously. consequently, the feel with which there are sufficient elasticity and a moderate feeling of an elongation stop, and the flexible material touches a hand is good, and is not in a commercial disposable diaper -- high -- aesthetic property.
[0089] Thereby, it turns out that the absorptivity goods c of the example 20 which has arranged the elasticity compound sheet of an example 19 as flexible material of the circumference of the waist are effective.
[0090]
[Effect of the Invention] The nonwoven fabric of this invention enables offer of the nonwoven fabric which has flexibility, high ductility, and reinforcement with sufficient balance while being bulky [which was not obtained conventionally]. In addition to the loft and flexibility which the nonwoven fabric of this invention has, extensibility, and reinforcement, the more highly efficient

compound-ized nonwoven fabric and elasticity compound-ized sheet which employed efficiently the special feature which the partner of the laminating has, and the description can be offered by carrying out the laminating of the elasticity sheet which consists of the nonwoven fabric, other nonwoven fabrics, and elastomer of this invention. furthermore, there are a loft and outstanding extensibility by arranging the nonwoven fabric or elasticity compound sheet of this invention to the part -- flexible -- high -- aesthetic property absorptivity goods can be offered.

[Translation done.]

* NOTICES *

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3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the whole nonwoven fabric top view which is one example of this invention.
[Drawing 2] In drawing 1 , it is a sectional view in straight-line X1-X1'.
[Drawing 3] It is the top view of the nonwoven fabric which is one example of this invention which established the thermal bond field in elliptical.
[Drawing 4] It is the top view of the nonwoven fabric which is one example of this invention which prepared the thermal bond field in the shape of a rectangle.
[Drawing 5] It is an enlarged drawing near [in drawing 1] a thermal bond field.
[Drawing 6] It is an enlarged drawing near [in drawing 2] a thermal bond field.
[Drawing 7] It is the whole top view showing an example of the absorptivity goods which used the nonwoven fabric of this invention for the facing.
[Drawing 8] It is a sectional view in straight-line X2-X2' of the absorptivity goods in drawing 7 .
[Drawing 9] It is the whole top view Fig. showing an example of the absorptivity goods which used the nonwoven fabric of this invention for the facing.
[Drawing 10] It is the sectional view of straight-line X3-X3' of the absorptivity goods in drawing 9 .
[Description of Notations]
1 Thermal Bond Field
2 Non-Thermal Bond Field
3 Part into which Thermal Bond Field and Non-Thermal Bond Field are Intermingled
4 Flexible Material of Circumference of Waist
5 Backseat
6 Facing
7 Side Gathers
8 Absorption Layer
9 Facing
10 Absorption Layer
11 Backseat
12 Tissue Paper

[Translation done.]

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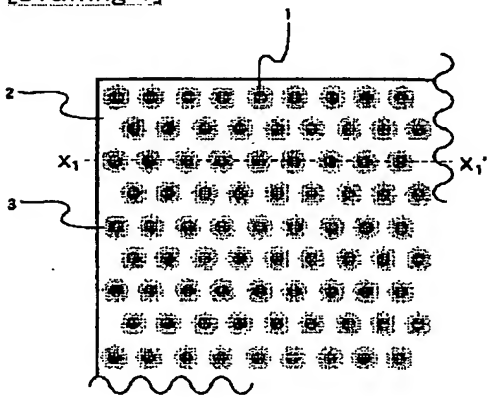
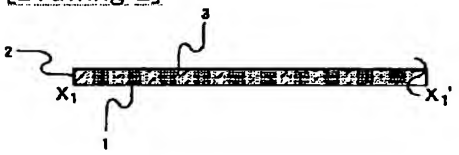
DRAWINGS

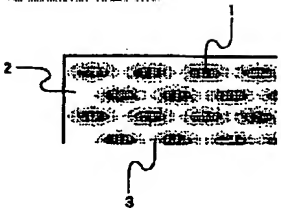
[Drawing 1]



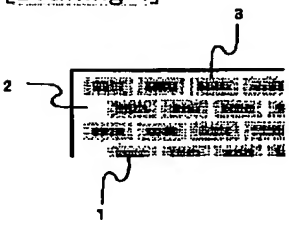
[Drawing 2]



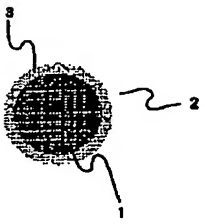
[Drawing 3]



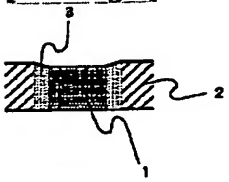
[Drawing 4]



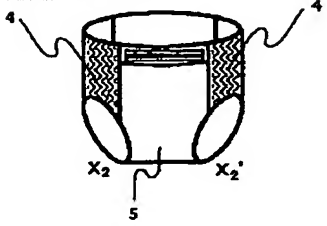
[Drawing 5]



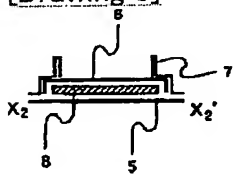
[Drawing 6]



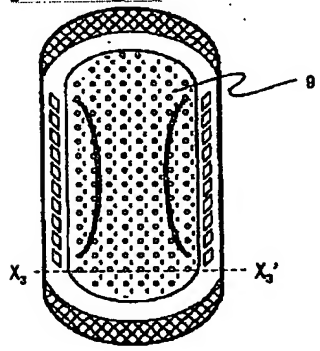
[Drawing 7]



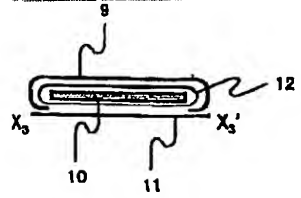
[Drawing 8]



[Drawing 9]



[Drawing 10]



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